Strategic Resources Assessment Final Environmental Impact Statement

May 1997

Seattle City Light

SEATTLE CITY LIGHT
STRATEGIC RESOURCES ASSESSMENT

FINAL
ENVIRONMENTAL IMPACT STATEMENT

Prepared by

Seattle City Light
Environment and Safety Division
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In Association with
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May 30, 1997

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FACT SHEET

Project Title	Seattle City Light Strategic Resources Assessment (SRA)
Description	Seattle City Light (SCL) has prepared a Strategic Resources Assessment which assesses the utility's need for additional energy resources and evaluates energy resource options and policy issues to allow SCL to acquire sufficient energy resources to meet anticipated customer demand for electricity. SCL intends that this EIS will remain valid for the next several years, with changes in the alternatives or likely significant environmental impacts to be addressed by supplements or addenda to this EIS, as appropriate.
Project Location	This document is a non-project, or "programmatic," Environmental Impact Statement. The proposed action is not site-specific.
Proponent and Lead Agency	Seattle City Light
Proposed Date of Implementation	Over the next several years.
Responsible Official	Gary Zarker, Superintendent Seattle City Light 700 Fifth Avenue, Suite 3100 Seattle, Washington 98104-5031
Contact Person	Glenn Atwood, Senior Environmental Analyst Seattle City Light, Environment & Safety Division 700 Fifth Avenue, Suite 3100 Seattle, Washington 98104-5031 (206) 386-4594
Licenses Required	No licenses or permits are required for the City Council to adopt the Strategic Resources Assessment if it chooses to do so. Implementation of the policy recommendations and development of new energy resources could require specific permits or approvals. Permitting would be considered in any project-specific environmental review.
Authors and Principal Contributors	**Seattle City Light:** Glenn Atwood: Project manager, principal author Lynn Best, Ph.D., Jan Mulder, AICP: Environmental review

Beth Blattenberger, Dennis Parrish, Tony Kilduff: Technical review, SRA principal authors
Ted Elmer: Technical review
Doug Rough: Technical review
Wing Cheng: Power system modeling
Contributions: description of alternatives, computer modeling of alternative portfolios and recommendations, impact ranking, air impacts, environmental externalities, transmission lines, environmental dispatch, fuel switching, interruptible load, sale/loss of existing SCL resources.

Foster Wheeler Environmental Corporation
Contributions: environmental impacts to water, earth, plants, animals, land use, employment, environmental health, and cultural/historical resources.

Howard Wick, Energy Resources Consultant
Contributions: impacts to energy resources.

Date of Issue Final EIS May 30, 1997

Nature and Date of Final Action Ongoing over next several years as resource decisions are made.

Subsequent Environmental Review Development or acquisition of individual energy resources by SCL would require project-specific environmental review.

Location of Background Data
Seattle City Light
Environment & Safety Division
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Cost No charge

Appeals Appeals of the adequacy of this document are governed by Seattle Municipal Code 25.05.680. Copies of this code provision are available from the Seattle City Clerk.

To be timely, a notice of appeal must be received by the Office of the Hearing Examiner, 618 Second Avenue, Room 1320, Seattle, WA 98104, within 15 days of the date the notice of this EIS is filed with the SEPA Information Center or the date the notice is published in the Daily Journal of Commerce, whichever is later.

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SUMMARY

PURPOSE OF PROPOSAL

Seattle City Light (SCL) has prepared ~~is preparing~~ a Strategic Resources Assessment (SRA) to evaluate options and make recommendations for the acquisition of energy resources to meet future demand for electricity. ~~SCL expects to revise the SRA periodically to account for changed circumstances and new information.~~ This environmental impact statement (EIS) is intended to fulfill SCL's obligations for nonproject environmental review under the State Environmental Policy Act (WAC 197-11) and the City of Seattle's SEPA ordinance (SMC 25.05). At this nonproject or programmatic level, the analysis is of necessity general in nature. Additional project- and site-specific environmental review may be performed, as needed on specific proposals for development or acquisition of energy resources.

This Final EIS (FEIS) responds to all comments received on the Draft EIS. The majority of comments referred to SCL's characterization of the Centralia coal-fired power plant, which has been revised in response. Minor revisions are identified to Chapters 1 (Background) and 2 (Affected Environment). Only minor comments were received regarding the discussion of alternative energy resources in Chapters 3 and 4 and SCL has no reason to update or revise those chapters, so they are not included in the FEIS. No comments were received regarding the alternative portfolios discussed in Chapters 5 and 6. SCL did update its modeling of the alternative portfolios evaluated in the DEIS to reflect new assumptions concerning such variables as natural gas prices and SCL's load forecast. However, the results of the revised modeling do not change the qualitative impact ranking of the resource portfolios, so Chapters 5 and 6 have not been revised and are not repeated in the FEIS. The alternative recommendations have been revised since the DEIS to make them more useful, and the alternatives have been remodeled. Accordingly, Chapters 7 and 8 have been revised and are included in this FEIS.

Throughout this document, changes to the text are shown by shading (like this paragraph) for new information or by "~~strikeout~~" for substantive information that has been deleted. In the Summary and Chapters 7 and 8, all tables and figures regarding the alternative recommendations have been revised to reflect the revised alternatives. The original versions from the DEIS are not repeated in this document.

SCL intends that this EIS will remain valid the next several years. ~~for several iterations of the SRA process.~~ Changes in the alternatives to be considered or the likely significant environmental impacts would be addressed by supplements or addenda to this EIS, as appropriate.

OVERVIEW OF ALTERNATIVES

This FEIS describes and analyzes three sets of alternatives: 1) individual energy resource types, 2) long-term resource portfolios, and 3) near-term SRA recommendations.

Alternative Resource Types

The analysis of environmental impacts of individual energy resources is the foundation of subsequent analysis of alternative portfolios and SRA recommendations. Eleven alternative energy resource types have been identified as most likely to be considered for acquisition by SCL. They include: 1) conservation, 2) system efficiency measures, 3) small hydropower, 4) geothermal, 5) wind, 6) coal-fired resources, 7) combustion turbines, 8) cogeneration, 9) fuel cells, 10) fuel switching and 11) interruptible load. These resource types are described in Section 3.0 and their environmental impacts analyzed in Section 4.0. Transmission is discussed as well, since new or expanded transmission facilities may be required to deliver electricity from new generating resources.

Alternative Resource Portfolios

Seven long-term alternative resource portfolios are analyzed to highlight the environmental consequences of emphasizing particular policy goals or resource planning issues in resource acquisition decisions. Existing resource criteria established by city council policy include resource priority (with conservation having the highest priority), supply and cost certainty, cost effectiveness, environmental responsibility, and planning flexibility. The two issues considered in the development of the portfolios include concerns about the reliability and competitiveness of BPA as an electricity supplier and concerns about keeping SCL's rates as low as possible in the face of increased competition in the electric utility industry.

With these policy criteria and issues in mind, the following resource portfolios were developed for analysis: 1) No Action portfolio (or energy ~~spot~~ market reliance), 2) Status Quo portfolio, 3) Natural Gas Emphasis portfolio, 4) Less Environmental Impact portfolio, 5) Resource Diversity portfolio, 6) Firm Energy Purchase Emphasis portfolio, and 7) Bonneville Power Administration (BPA) Independence portfolio.

The portfolios were constructed to meet the anticipated need for resources in the year 2000 and 2010, assuming SCL's high case forecast of load growth and expected declines in the capability of SCL's existing resources, primarily through the expiration of long-term power sales contracts. All of the portfolios, except the Status Quo portfolio and BPA Independence portfolio, assume that SCL has rights to purchase power from BPA at approximately the level of its 1994 entitlement (220 aMW). In addition, all of the portfolios except the No Action portfolio assume that the utility acquires the services of an 85 MW dispatchable gas-fired resources (possibly by contract) in order to increase the amount of surplus or nonfirm hydropower that can be relied on to meet customer demand. The seven portfolios are described briefly below.

No Action portfolio—Under the No Action portfolio alternative (required under SEPA), SCL would take no action to acquire new firm energy resources. Rather, it would rely exclusively on energy[1/] ~~spot~~ market purchases to meet the need for new resources.

Status Quo portfolio—In this alternative, SCL would rely on a combination of its planned levels of conservation acquisition from the 1993 Conservation Implementation Plan and increased purchases from BPA.

Natural Gas Emphasis portfolio—Under this alternative, all resource needs would be met with natural gas-fired resources, including simple- and combined-cycle combustion turbines, cogeneration and fuel cells. Given existing forecasts of resource and fuel costs, this portfolio appears most likely to result in the lowest increase in rates of any of the alternative portfolios.

Less Environmental Impact portfolio—This alternative emphasizes the reduction of environmental impacts, particularly air emissions, and would rely on a combination of planned conservation levels, wind, geothermal, cogeneration and fuel cell resources.

Resource Diversity portfolio—This alternative stresses diversity of supply and would include conservation, natural gas-fired resources (combustion turbines, cogeneration and fuel cells), and wind and geothermal resources.

Firm Energy Purchase Emphasis portfolio—This portfolio highlights the future likelihood that energy suppliers would not be able or willing to disclose the specific source of electricity provided under firm energy purchase contracts. The environmental impacts of such contract resources will be inherently uncertain.

BPA Independence portfolio—Under this alternative, SCL would reduce its entitlement to purchase power from BPA to minimal levels and substitute a combination of conservation, natural gas-fired resources, and firm purchases.

The analysis of the alternative portfolios relies on a number of key assumptions. Consistent with the high case load growth used to anticipate the maximum likely range of environmental impacts, low-case fossil fuel prices and high-case economic and demographic growth assumptions are used. SCL is assumed to continue to own its existing generating

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[1/]All references to the terms "spot market" and "spot purchases" in the DEIS should be revised to read "energy market" and "market purchases," respectively. In the DEIS glossary, the term "spot purchases" was defined as "short-term power purchases (typically for a few hours to a few days) arranged with short notice (from a few hours to a day)" (DEIS, p. 9-6). The term "spot market" more correctly refers only to those transactions made with the shortest notice. The term "energy market" is more appropriate for the meaning intended in the FEIS, encompassing the DEIS definition for "spot purchases" as well as purchases of longer duration (up to a year) and with greater notice.

resources such as the Boundary and Skagit hydroelectric projects and its eight percent share of the Centralia coal-fired steam plant. The capability of SCL's existing resources is assumed to be constant for all portfolios in a particular year, and the capability of SCL's hydroelectric resources assumes the National Marine Fisheries Service's 1995 Biological Opinion, which affects regional river flows and hydroelectric plant operations.

Alternative SRA Recommendations

The ~~Draft~~ Strategic Resources Assessment focuses on four near-term resource acquisition issues: 1) the desired level of continued conservation acquisition, 2) the desired level of reliance on BPA for power purchases, 3) the desirability of the acquisition of a gas-fired dispatchable resource or its equivalent, 4) and the consideration of environmental externalities in resource acquisition decisions. In this EIS, each of these issues is first evaluated in isolation. Then four alternative sets of recommendations are analyzed. The four alternatives were created by combining a high and low level of both conservation acquisition and BPA entitlement. ~~In addition, SCL's integrated planning model was used to determine a desirable capacity of dispatchable resource for which to contract for services for each of the four combinations of conservation and BPA.~~

For the FEIS, Alternatives C and D no longer include a contract for a dispatchable resource. Also, a preferred alternative has been added, along with two variations which include 20 aMW of energy from a combined-cycle combustion turbine and simple-cycle combustion turbine respectively.

In the DEIS, the conservation assumptions for Alternatives A and C were termed "100% of current planned levels" and those for B and D were referred to as "60% of current planned levels." For the FEIS, the same assumptions were used for Alternatives A and C, but they are now referred to as "1992 Conservation Implementation Plan." The assumptions for Alternatives B and D have been revised to reflect the 1996 Energy Management Services Plan and include slightly higher levels of conservation (20 aMW rather than 19 aMW from 1996 through 1998) than were assumed in the DEIS.

The ~~four~~ alternative sets of recommendations are summarized in Table S-1.

The quantitative analysis of the ~~four~~ SRA recommendation alternatives focused on the year 1998. Similar assumptions were used as were used for the alternative portfolios, with the significant exception that the base case load forecast, rather then the high case, was assumed.

Table S-1. Resources Assumed for Alternative SRA Recommendations, Year 1998

Alternative SRA Recommendation	SRA Issues[1]		
	Conservation	BPA Purchases[2]	Dispatchable Resources
A	1992 Conservation Implementation Plan[3]	100% of 1994 entitlement (220 aMW)	None
B	1996 Energy Management Services Plan[4]	100% of 1994 entitlement (220 aMW)	None
C	1992 Conservation Implementation Plan[3]	50% of 1994 entitlement (110 aMW)	None
D	1996 Energy Management Services Plan[4]	50% of 1994 entitlement (110 aMW)	None
Preferred	1996 Energy Management Services Plan[4]	1996 Contract Amendment (195 aMW)	None
Variation 1	Same	Same	20 aMW CCCT[5]
Variation 2	Same	Same	20 aMW SCCT[6]

1/ Alternative recommendations represent combinations of conservation acquisition level, BPA purchase level, and dispatchable resources (combustion turbines). Energy market purchases are also assumed to be available for each alternative to meet demand or displace resources such as BPA or Centralia power plant.
2/ Maximum purchase; BPA energy can be displaced by surplus hydropower or energy market purchases.
3/ Assumes approximately 9 aMW from 1997 through 2000.
4/ Assumes approximately 6 aMW from 1997 through 2000.
5/ CCCT = combined-cycle combustion turbine.
6/ SCCT = simple-cycle combustion turbine.

Preferred Alternative

Based on developments since the publication of the DEIS, ~~the recommendations found in the Draft Strategic Resources Assessment,~~ SCL's current preferred alternative ~~is closest to Alternative D described in Chapter 8 of this DEIS and~~ consists of the following response to each of the four policy issues:

- Conservation acquisition: acquire approximately six average megawatts per year beginning in 1997, consistent with SCL's Energy Management Services Plan endorsed by the City Council on August 23, 1996. ~~reduce planned acquisition level to somewhere between five and seven aMW per year by 1999 (from former planned levels of approximately 10 aMW).~~
- BPA purchase level: purchase a maximum of 195 average megawatts of energy from BPA consistent with the terms of the amendment to SCL's purchase contract approved in August 1996, obtaining the balance of SCL's requirements from its existing resource portfolio and short-term market purchases. ~~continue to purchase at least 100 aMW of BPA as long as BPA rates and contract terms are reasonable, and replace remaining BPA purchases with nonfirm hydro and increased reliance on spot market purchases.~~
- Gas-fired dispatchable resource: do not contract for the output of such a resource at this time. ~~depending on the outcome of BPA contract negotiations, consider a short-term contract for dispatchable energy of an undetermined amount to supplement spot market purchases.~~
- Environmental externalities: continue to consider ~~include~~ externalities when making resource acquisition decisions.

SUMMARY OF IMPACTS AND MITIGATION

During scoping for this EIS, SCL identified the following environmental elements as having potentially significant adverse environmental impacts from SCL's future acquisition of energy resources to serve customer demand: 1) air quality, 2) surface and groundwater, 3) soils and geology, 4) plants and animals, 5) land use, 6) employment, 7) aesthetics and recreation, 8) environmental health (including noise), 9) cultural and historic resources, and 10) energy resources.

Alternative Resource Types

Figure S-1 provides a graphical summary of the relative environmental impacts of each of the alternative resource types. Four impact ranking categories were used to describe the relative magnitude of impacts between resource types: 1) high, 2) high-moderate, 3) moderate and 4) low.

Summary of Potential Mitigation Measures

A discussion of potential mitigation is appropriate for alternative resource types, rather than alternative portfolios or SRA recommendations. A minor exception to this is the issue of

Figure S-1. Potential Environmental Impacts of Conservation and Generation Resources and Other Means of Meeting Energy Loads

Resources	Environmental Elements									
	Air Quality	Surface and Groundwater	Soils and Geology	Plants and Animals	Land Use	Employment	Aesthetics and Recreation	Environ. Health, Including Noise	Cultural and Historical Resources	Energy Resources
Conservation Commercial, Residential, and Industrial Sectors						Beneficial				
System Efficiency Measures[1/]										
Small Hydropower										
Geothermal										
Wind										
Coal-Fired/Conventional Pulverized										
Coal-Fired / IGCC										
Combustion Turbines										
Cogeneration										
Fuel Cells										
Interruptible Load										

Relative impact level: High; High-moderate; Moderate; Low

1/ The impact of all system efficiency measures is considered low except for the Gorge Companion Tunnel, which is considered moderate for surface and groundwater, soils and geology, plants and animals, and aesthetics and recreation.

environmental dispatch, which is discussed in Section 6.3 as possible mitigation at the portfolio level. Potential mitigation measures for alternative resource types are summarized below.

Conservation

- Safe asbestos removal
- CFC recycling
- Indoor air monitoring
- Ventilation
- Hazardous waste disposal at approved sites
- Avoid historically significant features

System efficiency measures

- Disposal of PCBs from electrical equipment at approved sites
- Best Management Practices (BMP) for erosion control
- Surveys and avoidance of threatened and endangered species and sensitive habitat (Gorge Tunnel)

Small hydropower

- Water temperature and nutrient monitoring
- Adjust flows to maintain water quality
- BMP for erosion control
- Avoid Northwest Power Planning Council protected areas
- Surveys and avoidance of threatened and endangered species and sensitive habitat
- Siting to minimize land use impact
- Recreation enhancement
- Landscaping and site design
- Noise abatement
- Surveys and avoidance of cultural and historic sites

Geothermal

- Sulfur recovery from hydrogen sulfide emissions
- Air emission controls
- Wastewater treatment
- Water recycling and reinjection
- BMP for erosion control
- Spill prevention/cleanup plan
- Surveys and avoidance of threatened and endangered species and sensitive habitat
- Siting to minimize land use, aesthetic and recreation impacts
- Slant drilling
- Landscaping and site design
- Noise abatement
- Surveys and avoidance of cultural and historic sites

Wind

- BMP for erosion control
- Surveys and avoidance of threatened and endangered species and sensitive habitat
- Avoid bird migration corridors
- Siting to minimize land use impact
- Landscaping and site design
- Limit height
- Surveys and avoidance of cultural and historic sites

Coal-fired resources (pulverized and IGCC)

- Implement Best Available Control Technology (BACT) and/or Lowest Achievable Emission Rate (LAER) techniques to control air emissions
- Wastewater treatment/cooling
- BMP for erosion control
- Ash/solid waste disposal at approved sites
- Surveys and avoidance of threatened and endangered species and sensitive habitat
- Siting to minimize land use impact
- Landscaping and site design
- Noise abatement
- Surveys and avoidance of cultural and historic sites

Combustion turbines

- Implement Best Available Control Technology (BACT) and/or Lowest Achievable Emission Rate (LAER) techniques to control air emissions
- Wastewater treatment/cooling
- Spill prevention/cleanup plan
- BMP for erosion control
- Gas pipeline siting/wildlife crossings
- Siting to minimize land use impact
- Noise abatement
- Surveys and avoidance of cultural and historic sites

Cogeneration

- Implement Best Available Control Technology (BACT) and/or Lowest Achievable Emission Rate (LAER) techniques to control air emissions
- Wastewater treatment/cooling
- Spill prevention/cleanup plan
- BMP for erosion control
- Gas pipeline siting/wildlife crossings
- Noise abatement
- Surveys and avoidance of cultural and historic sites

Fuel cells

- Implement Best Available Control Technology (BACT) and/or Lowest Achievable Emission Rate (LAER) techniques to control air emissions
- Wastewater treatment/cooling

- Gas pipeline siting
- Noise abatement
- Proper disposal of spent fuel cells

Fuel switching (expansion of gas lines)
- BMP for erosion control
- Use existing utility corridors

Interruptible load contracts
- None

New or expanded transmission
- Site generation facilities close to load centers or existing transmission rights of way to reduce the need for new transmission facilities
- BMP for erosion control
- Avoid or reduce the use of herbicides and employ nonchemical right of way maintenance methods
- Install spill containment around oil-containing electrical equipment
- Site transmission facilities to avoid or reduce visual impacts
- Surveys and avoidance of cultural and historic sites

Unavoidable Significant Adverse Environmental Impacts

There are no unavoidable significant adverse impacts associated with conservation, system efficiency measures, and interruptible load contracts.

Following is a discussion of unavoidable adverse impacts common to certain categories of generation resource types. Whether or not these unavoidable impacts are significant will vary by project and depend in part on where the facility is located and the mitigation that is applied.

All new generation facilities are likely to have the following unavoidable potential adverse environmental impacts.

- Displacement of alternative land uses
- Temporary soil disturbance
- Increased need for transmission facilities and associated impacts (except where built next to existing facilities with adequate capacity)

Fossil-fueled generation facilities, both new and existing, will have the following unavoidable potential adverse environmental impacts. (Geothermal resources share all of the potential impacts except consumption of fossil fuels.)

- Emissions of air pollutants
- Emission of carbon dioxide and possible contribution to global climate change
- Consumption of water for cooling and other purposes

- Discharge of waste heat to the environment
- Consumption of fossil fuels

For resource types such as wind and geothermal, whose siting is restricted by the availability of the primary energy source (sufficient average wind speeds and geothermal reservoirs, respectively), there is a greater possibility of the following unavoidable adverse impacts.

- Permanent loss of vegetation and wildlife habitat
- Visual, aesthetic, or recreation impacts

Alternative Resource Portfolios

Figure S-2 compares the estimated impact magnitude for each of the alternative portfolios using a similar set of categories as those used to rank the impacts of alternative energy resource types. For those environmental elements whose ranking is based in part on quantified estimates of impacts or environmental measures (air quality, surface and groundwater, soils and geology, land use, and energy resources), uncertainty exists regarding the various assumptions used in SCL's modeling of electricity generation patterns.

Alternative SRA Recommendations

The following discussion summarizes the likely environmental consequences of each of the four near-term issues ~~being~~ addressed in the ~~Draft~~ Strategic Resources Assessment. The relative environmental impacts of each of the ~~four~~ SRA Recommendation Alternatives is then summarized in Figure S-3. As with the analysis of the alternative portfolios, for those environmental elements whose ranking is based in part on quantified estimates of impacts or environmental measures, uncertainty exists regarding the various assumptions used in SCL's modeling of electricity generation patterns.

Conservation Acquisition

Reducing SCL's level of conservation from previously planned levels is likely to result in an increase in the electricity produced by fossil-fueled generating plants and a corresponding increase in their operational environmental impacts. These include emissions of air pollutants such as nitrogen oxides, sulfur oxides, and particulates; emissions of carbon dioxide, a greenhouse gas contributing to the potential for global climate change; water consumption and the discharge of wastewater and waste heat into the environment; and increased consumption of fossil fuels and corresponding fuel extraction and transportation impacts.

Level of BPA Power Purchases

Unless water in the Columbia system would otherwise be spilled past partially loaded hydroelectric turbines, increases or decreases in SCL's BPA purchase levels are likely to cause corresponding increases or decreases, respectively, of fossil-fueled generation serving

Figure S-2. Environmental Impact Magnitude of Alternative Resource Portfolios

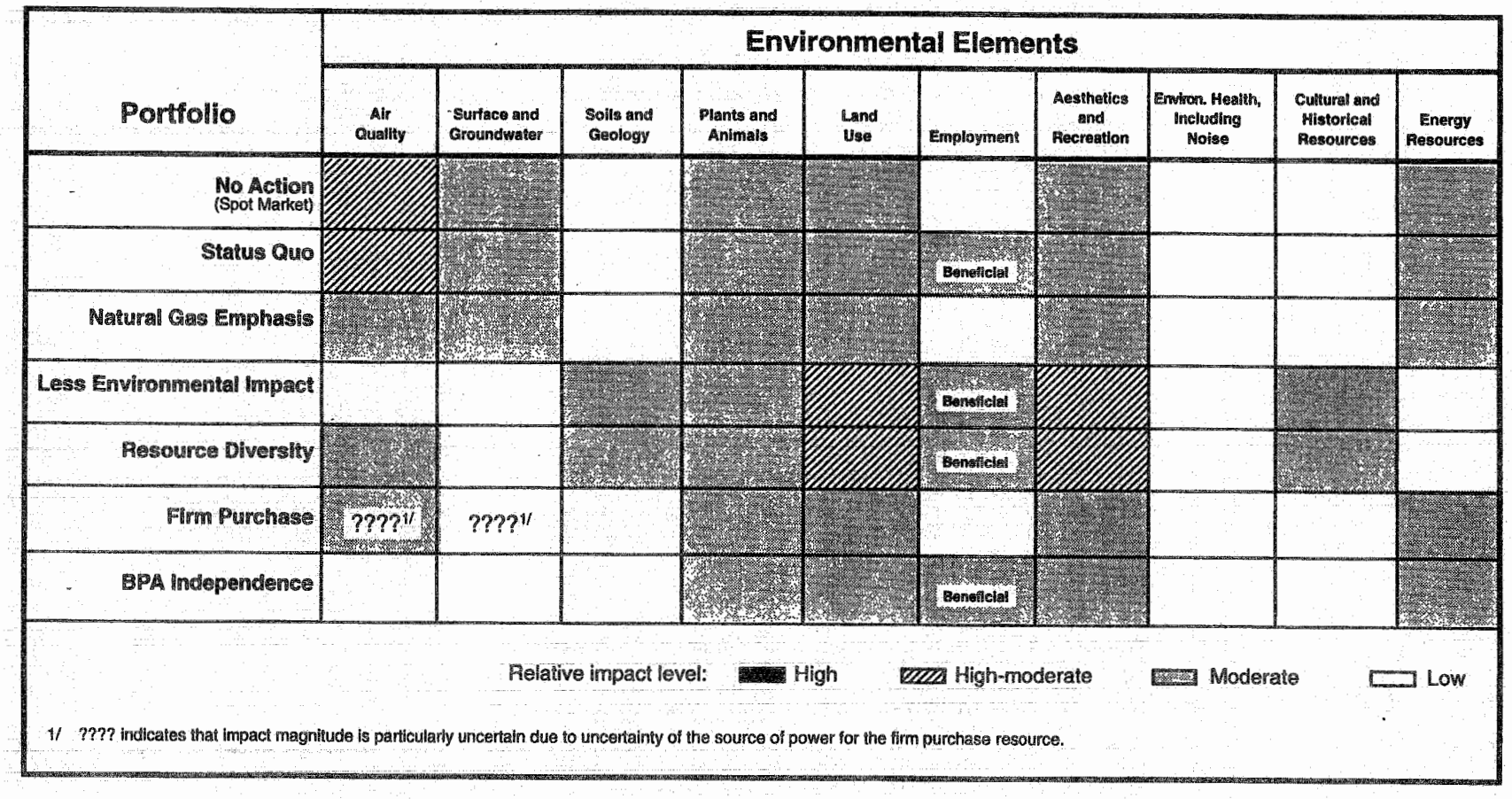

Figure S-3. Environmental Impact Magnitude of Alternative SRA Recommendations

Recommendation	Environmental Elements									
	Air Quality	Surface and Groundwater	Soils and Geology	Plants and Animals	Land Use	Employment	Aesthetics and Recreation	Environ. Health, Including Noise	Cultural and Historical Resources	Energy Resources
Alternative A						Beneficial				
Alternative B										
Alternative C						Beneficial				
Alternative D										
Preferred										
Variation 1										
Variation 2										

Relative impact level: High High-moderate Moderate Low

the energy ~~spot~~ market in the Pacific Northwest or western U.S, either directly or indirectly. This effect could occur directly because BPA had to increase its ~~spot~~ market purchases to meet SCL's demand, or indirectly because BPA would have otherwise sold the foregone power and as a result displaced a fossil fuel resource operating on the margin. The source of energy ~~spot~~ market generation is uncertain but could be either coal- or natural gas-fired plants, depending on what resources are operating on the margin. (To the extent that increased ~~spot~~ market purchases occurred at a time when water would have otherwise been spilled past hydroelectric generators operating at less than full capacity, ~~because water flows exceed generation capacity,~~ then there would be no corresponding increase in the operation of fossil-fuel plants). Therefore, if SCL were to decrease its existing BPA purchase levels, the net environmental impact would depend on how the source of replacement power compared to an uncertain mix of existing fossil-fuel plants, including both coal and natural gas.

If the replacement power were provided by a firm contract for an existing natural gas-fired resource such as a combustion turbine, overall impacts would likely be lower than continued BPA purchases because of the avoidance of coal-fired generation. (However, this difference would be lessened to the extent the contracted resource would otherwise have been used to sell to the energy ~~spot~~ market.) If SCL were to construct or contract for the output of a new natural gas-fired combustion turbine, there would be additional construction-related impacts but the operational impacts, particularly air emissions, would be expected to be even lower because of higher efficiencies and more stringent emission control requirements. If SCL were to rely on increased ~~spot~~ market purchases to replace existing levels of BPA purchases, there likely would be little or no net effect on the operation of fossil-fuel plants in the western U.S. and no associated change in significant environmental impacts. ~~However, increasing its reliance on spot market purchases may increase SCL's risk that it would not have adequate power supplies in the future. The resources being relied upon to meet its load would no longer be either owned by SCL or under long term contract.~~

Gas-Fired Dispatchable Resource

One of the ~~main~~ reasons SCL would contract for the services of a gas-fired dispatchable resource (such as a combined-cycle or simple-cycle combustion turbine) is as a backup resource so that SCL can make greater use of its own nonfirm hydropower production to reliably serve its own load. Under the concept of "firming nonfirm," SCL could declare a portion of its nonfirm hydropower as firm if it has another resource available to substitute for the hydropower during low water conditions.

The potential environmental impacts of contracting for the services of a dispatchable resource, likely a combined-cycler or simple-cycle combustion turbine, are expected to ~~be minor and~~ result from two primary factors: (1) the shift in disposition in SCL's nonfirm hydropower, and (2) the expected operation of the dispatchable resource compared to the resource(s) that would have operated otherwise.

The shift in SCL's nonfirm hydropower is expected to result in little change in resource operations and associated environmental impacts. Rather than selling its nonfirm hydropower and displacing others' marginal fossil fuel resources, SCL would use the nonfirm to serve its own load and likely reduce its purchases from BPA and the energy ~~spot~~ market, which would be expected to result in very similar patterns of resource displacement and little net change in environmental impacts.

Regarding the operation of the dispatchable resource, there could be a net decrease in fossil-fuel generation and associated impacts under two circumstances. The first is if SCL's contract and the operation of the dispatchable resource, ~~assumed to be a simple cycle combustion turbine,~~ resulted in a net decrease in ~~less efficient, more polluting~~ gas-fired generation or in coal-fired generation. This would ~~could~~ occur if SCL relied on power from the dispatchable resource ~~instead of market purchases. when others would have purchased coal fired generation instead, for example, through spot market purchases. This is unlikely to occur frequently, because SCL would be relying on the dispatchable resource during periods of low water conditions when regional coal plants likely would be operated at full capacity and more expensive gas fired plants would be the marginal resource.~~ The other circumstance is if SCL contracted for the development of a new dispatchable resource, which would be more efficient and would have to meet more stringent pollution control requirements than existing plants.

Environmental Externalities

Environmental externalities refer to the societal costs of environmental impacts which are not borne by the producers of a product and therefore not reflected in its price. SCL has recommended a set of externality cost adders for use in resource planning (SCL, 1994c; SCL, 1996). Their inclusion in the economic evaluation of resource options allows for the consideration of a societal perspective when determining the relative cost-effectiveness of alternative resources.

The potential environmental impacts of including externalities in resource decisions arise from their effect on the outcome of the other three policy issues discussed above. In this context, their effect is to favor ~~would be limited primarily to favoring~~ higher levels of conservation and therefore reduce ~~reducing~~ the impacts associated with construction and operation of generating resources. Conservation is assumed to have an externality cost of zero, consistent with its having the fewest impacts of any alternative resource type.

With regard to the issues of BPA purchase levels and contracting for a dispatchable resource, the consideration of externalities is likely to favor a dispatchable resource contract over BPA purchases or market purchases because of the potential to displace coal-fired generation.

~~The consideration of environmental externalities is likely to have little potential effect on decisions regarding the other two issues, BPA purchase levels and contracting for a dispatchable resource, because the alternatives result in a relatively small range of potential environmental impacts and associated externality costs.~~

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1.0 BACKGROUND

1.1 STRATEGIC RESOURCES ASSESSMENT

Seattle City Light (SCL) has prepared a ~~is in the process of preparing its most recent~~ Strategic Resources Assessment (SRA) to evaluate options for supplying its customers' demand for electricity. It is expected that SCL will update this plan periodically to reflect changing conditions. SCL's resource planning process evaluates electricity resources, both generation and conservation, at a generic level, rather than on a project-specific basis.

SCL's current Strategic Resources Assessment process focused ~~is focusing~~ on four specific policy issues of immediate interest to the utility and city decision-makers:

- The level of continued conservation acquisition in the face of reduced external funding;
- The level of reliance on the Bonneville Power Administration (BPA) for a portion of SCL's firm resources;
- Whether SCL should acquire a dispatchable gas-fired resource or its contractual equivalent; and
- Consideration of environmental externalities in resource acquisition decisions.

These issues are described in greater detail in Section 7.0 under the discussion of alternative recommendations.

SCL intends that this environmental impact statement (EIS) will remain valid for multiple resource planning cycles. Under this approach, environmental review of new issues or recommendations addressed in subsequent Strategic Resource Assessments will be carried out through supplements or addenda to this EIS, as appropriate.

1.2 ORGANIZATION OF EIS

This EIS is organized to reflect three levels of analysis:

- Alternative energy resource types;
- Alternative long-term resource portfolios; and
- Alternative near-term recommendations.

Each of these levels of analysis is dealt with under a pair of chapters, the first describing the alternatives to be evaluated and the second evaluating their environmental impacts.

As explained below, no revisions were required to the DEIS' discussion of alternative energy resources in Chapters 3 and 4 and alternative long-term resource portfolios in Chapters 5 and 6, so those chapters are not included in the FEIS.

The individual resource types include those conservation and generation technologies which are being considered by SCL in its resource planning process. Additionally, resource types that have been screened from further consideration, and are not considered in detail in this EIS, were ~~are~~ briefly described in the DEIS.

The alternative resource portfolios represent combinations of resources which together meet SCL's need for resources resulting from the high case forecast of load growth (see DEIS Table 5-1) and known loss of existing resource capability, primarily from the expiration of existing long-term power contracts. The portfolios have been constructed to highlight or reflect the existing city council policy regarding resource acquisition, the fundamental tradeoffs inherent in resource planning decisions, and particularly significant issues facing the utility. The analysis of the alternative portfolios is intended to highlight the long-term impacts of a range of plausible strategies the utility could pursue over the next 15 years. The high case load forecast was used to anticipate the maximum likely magnitude of environmental impacts.

The final level of analysis is included in this document and focuses on the likely range of near-term recommendations that could result from the Strategic Resources Assessment that has been prepared. ~~currently being prepared.~~ The alternatives have been structured to reflect plausible combinations of responses to the primary policy issues that the Strategic Resources Assessment addressed ~~is addressing.~~

This FEIS responds to all comments received on the Draft EIS. The majority of comments referred to SCL's characterization of the Centralia coal-fired power plant, which has been revised in response. Minor revisions are identified to this chapter (Background) and Chapter 2 (Affected Environment). Section 1.3, Seattle City Light Loads and Resources, is not included in the FEIS. Only minor comments were received regarding the discussion of alternative energy resources in Chapters 3 and 4 and SCL has no reason to update or revise those chapters, so they are not included in the FEIS. No comments were received regarding the alternative portfolios discussed in Chapters 5 and 6. SCL did update its modeling of the alternative portfolios evaluated in the DEIS to reflect new assumptions concerning such variables as natural gas prices and SCL's load forecast. However, the results of the revised modeling do not change the qualitative impact ranking of the resource portfolios, so Chapters 5 and 6 have not been revised and are not repeated in the FEIS. The alternative recommendations have been revised since the DEIS to make them more useful, and the alternatives have been remodeled. Accordingly, Chapters 7 and 8 have been revised and are included in this FEIS.

Throughout this document, changes to the text are shown by shading (like this paragraph) for new information or by "~~strikeout~~" for substantive information that has been deleted. In the Summary and Chapters 7 and 8, all tables and figures regarding the alternative recommendations have been revised to reflect the revised alternatives. The original versions from the DEIS are not repeated in this document.

1.3 SEATTLE CITY LIGHT LOADS AND RESOURCES

Section 1.3 remains as presented in the DEIS.

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2.0 AFFECTED ENVIRONMENT

Section 2.1 through 2.8 and Section 2.10 remain as presented in the DEIS.

Section 2.9 is revised as follows:

Cultural and historical resources are the non-renewable evidence of human occupation or activity. This evidence may be reflected in a district, site, building, structure, artifact, ruin, object, work of art, architecture, landscape or natural feature. Cultural and historical resources include traditional cultural properties and cultural/historic landscapes. Cultural and historical resources are important in human history and are defined at the national, state, or local level. Cultural and historical resources that could be affected by the construction and/or operation of electric generation plants are located throughout the study area (BP, 1993).

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3.0 DESCRIPTION OF ALTERNATIVE ENERGY RESOURCES

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4.0 ENVIRONMENTAL IMPACTS OF AND MITIGATION FOR ALTERNATIVE ENERGY RESOURCES

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5.0 DESCRIPTION OF ALTERNATIVE RESOURCE PORTFOLIOS

Chapter 5.0 remains as presented in the DEIS.

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6.0 ENVIRONMENTAL IMPACTS AND MITIGATION FOR ALTERNATIVE RESOURCE PORTFOLIOS

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7.0 ALTERNATIVE NEAR-TERM SRA RECOMMENDATIONS

The previous four chapters of the DEIS form the foundation of analysis for the subsequent two chapters in this EIS. These previous chapters described alternative energy resources, seven portfolios of energy resources, and the environmental effects of these alternatives over the long-term planning horizon. The alternative energy resources described were those identified by SCL as being considered for future acquisition. The portfolios of individual resources represent alternative policy choices that would guide SCL's acquisition of individual energy resources in the future. As a reminder, the portfolios included: No Action (energy ~~spot~~ market purchases), Status Quo, Natural Gas Emphasis, Less Environmental Impact, Resource Diversity, Firm Purchase, and BPA Independence.

In contrast, this chapter describes four alternative courses of action that could guide the near-term acquisition of energy resources over the next two to five years, as well as a preferred alternative reflecting adoption of the Energy Management Service Plan and BPA contract amendment. The specific courses of action are evaluated in detail in SCL's Draft Strategic Resources Assessment (1996). None of these alternatives directly corresponds to any of the resource portfolios described earlier, but they are similar in that they are made up of several types of energy resources that could be acquired to meet the anticipated energy demand. As such, they represent a likely range of alternative choices available to SCL to alter its current portfolio of acquired energy resources in the near term.

7.1 STRATEGIC RESOURCES ASSESSMENT POLICY CHOICES

SCL's ~~current~~ Strategic Resources Assessment (SRA) process focused ~~is focusing~~ on four specific policy issues of immediate interest to the utility and city decision-makers:

- Level of continued conservation acquisition;
- Level of reliance on the Bonneville Power Administration;
- Acquisition of a dispatchable resource or its contractual equivalent; and
- Consideration of environmental externalities in resource acquisition decisions.

Each of these issues is discussed briefly below, followed by a summary of the ~~four~~ alternative sets of recommendations. The ~~four~~ alternatives ~~which~~ represent combinations of recommendations for three of the four policy issues. ~~are intended to bracket the likely outcome of the final SRA recommendations.~~ The environmental analysis found in the following chapter focuses on the year 1998 to represent the near-term environmental impacts of the recommendations.

7.1.1 Conservation Acquisition

In August, 1996 the City Council endorsed the Energy Management Services Plan, which presents the direction of SCL's conservation and energy efficiency programs and services over the period 1997 to 2002. The plan represents a slowing of the pace of conservation

originally identified in the 1992 Conservation Implementation Plan (CIP), from an average of ten average megawatts per year to about six per year.

~~SCL is now in the third year of implementing the 1992 Conservation Implementation Plan (CIP).~~ In accordance with the recommendations from the 1992 Energy Resources Strategy (SCL, 1992), the CIP called ~~calls~~ for SCL to conserve about 100 aMW of energy through 2003, enough conservation to serve the utility's projected load growth over that same period. One of the plan's key assumptions was the continued availability of conservation funding from BPA. At that time, ~~Until recently,~~ BPA funded approximately two-thirds of the cost of SCL's conservation programs.

Significant changes in several areas ~~have~~ led SCL to reassess its conservation goals. The most important is BPA's decision to cease conservation funding to utilities, including SCL, beginning October 1, 1995. In addition, natural gas prices have dropped significantly over the last several years. As a result, the avoided cost of power has declined and with it the projected value of conservation savings.

In the DEIS, the conservation assumptions for Alternatives A and C were termed "100% of current planned levels" and those for B and D were referred to as "60% of current planned levels." For the FEIS, the same assumptions were used for Alternatives A and C, but they are now called "1992 Conservation Implementation Plan." The assumptions for Alternatives B and D have been revised to reflect the 1996 Energy Management Services Plan and include slightly higher levels of conservation (20 aMW rather than 19 aMW from 1996 through 1998) than were assumed in the DEIS.

~~Two conservation levels are included in the alternative recommendations:~~

- ~~Continuation of current planned acquisition levels (approximately 9 aMW in 1996, declining to 7 aMW in 2000).~~
- ~~Approximately 60 percent of current planned levels (approximately 6 aMW in 1996, declining to 4.5 aMW in 2000).~~

7.1.2 BPA Reliance

BPA faces significant challenges and has implemented ~~proposed~~ sweeping changes in the way it sells power, in its rate structure, and in its contracts with its utility customers. ~~Many of these changes remain uncertain at this time, but they may cause SCL to limit its purchases from BPA. Examples include a general increase in BPA prices or a substantial increase in the availability charge, which is the amount SCL must pay for the right to purchase a unit of power from BPA, whether or not the power is actually taken.~~ This analysis assumes that SCL will no longer be able to rely on BPA to meet its load growth and to provide its load/resource balance, as BPA was ~~has been~~ obligated to do under SCL's ~~existing~~ power sales contract prior to the 1996 contract amendment. ~~contact.~~

Under this amendment, SCL can purchase no more than 195 aMW per year of energy through 2001, when the contract expires. SCL can displace at least 80% of this amount, subject to an availability charge on the energy not taken.

The alternative recommendations consider two levels of future energy purchases from BPA:

- SCL's 1994 entitlement from BPA, approximately 220 aMW; and
- Half that amount, or 110 aMW.

These are set as maximum amounts which can be displaced by SCL's existing resources or market purchases. In addition, the preferred alternative includes the 195 aMW level of the 1996 contract amendment.

7.1.3 Gas-Fired Dispatchable Resource

Dispatchable resources, including combustion turbines and fuel cells, are those that can be turned on and off on short notice ~~(including combustion turbines and fuel cells)~~. Fuel cells, however, are not expected to be commercially available or cost-effective in the next several years. In its 1990 Strategic Corporate Plan (SCL, 1990) and the 1992 Energy Resources Strategy (SCL, 1992), SCL recommended acquiring the services of a combustion turbine to complement its hydroelectric resource base. ~~To date, there has been no final decision on whether SCL should proceed to acquire such services.~~ In July 1995, SCL issued a final environmental impact statement addressing the impacts of building and where to site a combustion turbine and the option of contracting for the output of a combustion turbine to provide equivalent services (SCL, 1995a). SCL has deleted the combustion turbine project from its Capital Improvement Program, but it is possible the utility could consider contracting for the services of a dispatchable resource at some point in the future.

A dispatchable resource is attractive to SCL because it would fit well with its hydroelectric-dominated system. Hydroelectric resources, particularly run-of-river ones such as SCL's Boundary project, are highly variable in their output. Dispatchable resources could be operated to compensate for this variability, thus allowing for more of the hydroelectric project's output to be considered firm. This concept is called firming of nonfirm energy. A dispatchable resource could also supplement increased reliance on the energy ~~spot~~ market, as well as provide capacity to help meet peak loads. Dispatchable resources such as combustion turbines have low fixed costs compared to baseload resources, an important consideration for resources that in some years may run very little or not at all.

SCL could acquire a dispatchable resource by either building and owning the resource or by contracting with another party for the equivalent services. A contract could be for the output of a particular dispatchable resource, or the source of the power may not be known, such as from a system sale. This analysis assumes the services of a dispatchable resource would be acquired through a contract and that the ultimate source of the power would be either a combined-cycle or simple-cycle combustion turbine.

For the FEIS, Alternatives C and D no longer include a contract for a dispatchable resource. However, the preferred alternative includes two variations with 20 aMW of energy from a combined-cycle combustion turbine and simple-cycle combustion turbine respectively.

~~For each of the four alternative sets of recommendations, a potentially desirable amount of dispatchable resources was determined using SCL's Integrated Planning Model. To start, the two options for each of the conservation and BPA issues were combined into four possible combinations. Each combination was then used as an initial set of assumptions for the model, which determined the least cost mix of resource options to meet load, including level of dispatchable acquisition and spot market purchases.~~

7.1.4 Environmental Externalities in Resource Acquisition

Environmental externalities refer to the societal costs of environmental impacts that are not borne by the producers of a product and therefore are not reflected in the product's price. SCL has incorporated a set of externality costs for use in resource planning (SCL, 1994c). Their inclusion in the economic evaluation of resource options allows consideration of a societal perspective.

Environmental externalities were not used explicitly in developing the alternative sets of SRA recommendations analyzed in Section 8.0. However, their inclusion in resource acquisition decisions are likely to favor higher levels of conservation acquisition, as conservation has the lowest environmental externality costs of any alternative resource.

With regard to the issues of BPA purchase levels and contracting for a dispatchable resource, the consideration of externalities is likely to favor a dispatchable resource contract over BPA purchases or market purchases because of the potential to displace coal-fired generation with the output of the dispatchable resource.

7.2 SUMMARY OF ALTERNATIVE SRA RECOMMENDATIONS

~~The following~~ Table 7-1 presents the ~~four~~ alternative sets of recommendations analyzed in this FEIS. ~~draft EIS.~~ ~~As~~ As described above, ~~the~~ Alternatives A through D were constructed by combining each of the two alternative recommendations for the conservation and BPA reliance issues into four possible combinations. ~~A desirable quantity of dispatchable resource (in MW of capacity) was then determined for each combination of conservation and BPA, using SCL's Integrated Planning Model.~~ The alternatives, labeled as A through D, are presented in order of increasing need for additional resources. The need for additional resources is created by both the base case forecasted load growth and the reductions in conservation levels or BPA entitlement assumed in the alternatives. The base case forecast was used for analysis of the alternative recommendations because it is expected that the actual resource decisions arising from the SRA will rely on the base case forecast. There is a relatively small risk of it being significantly wrong in the near-term.

Table 7-1. Resources Assumed for Alternative SRA Recommendations, Year 1998

Alternative SRA Recommendation	SRA Issues[1/]		
	Conservation	BPA Purchases[2/]	Dispatchable Resources
A	1992 Conservation Implementation Plan[3/]	100% of 1994 entitlement (220 aMW)	None
B	1996 Energy Management Services Plan[4/]	100% of 1994 entitlement (220 aMW)	None
C	1992 Conservation Implementation Plan[3/]	50% of 1994 entitlement (110 aMW)	None
D	1996 Energy Management Services Plan[4/]	50% of 1994 entitlement (110 aMW)	None
Preferred	1996 Energy Management Services Plan[4/]	1996 Contract Amendment (195 aMW)	None
Variation 1	Same as Preferred	Same as Preferred	20 aMW CCCT[5/]
Variation 2	Same as Preferred	Same as Preferred	20 aMW SCCT[6/]

1/ Alternative recommendations represent combinations of conservation acquisition level, BPA purchase level, and dispatchable resources (combustion turbines). Energy market purchases are also assumed to be available for each alternative to meet demand or displace resources such as BPA or Centralia power plant.

2/ Maximum purchase; BPA energy can be displaced by surplus hydropower or energy market purchases.

3/ Assumes approximately 9 aMW from 1997 through 2000.

4/ Assumes approximately 6 aMW from 1997 through 2000.

5/ CCCT = combined-cycle combustion turbine.

6/ SCCT = simple-cycle combustion turbine.

7.3 PREFERRED ALTERNATIVE

Based on developments since the publication of the DEIS, SCL's preferred alternative ~~Based on the recommendations found in the Draft Strategic Resources Assessment, SCL's preferred alternative is closest to Alternative D above and~~ consists of the following response to each of the four policy issues:

- Conservation acquisition: acquire approximately six average megawatts per year, consistent with SCL's Energy Management Services Plan endorsed by the City Council on August 23, 1996. ~~reduce planned acquisition level to somewhere between five and seven aMW per year by 1999 (from former planned levels of approximately 10 aMW).~~
- BPA purchase level: purchase a maximum of 195 average megawatts of energy from BPA consistent with the terms of the amendment to SCL's purchase contract approved in August 1996, obtaining the balance of its requirements from its existing resource portfolio and short-term market purchases. ~~continue to purchase at least 100 aMW from BPA (approximately 50 percent of 1994 entitlement) as long as BPA rates and contract terms are reasonable and replace remaining BPA purchases with nonfirm hydroelectric energy and increased reliance on spot market purchases.~~
- Gas-fired dispatchable resource: do not contract for the output of such a resource of this time. ~~depending on the outcome of BPA contract negotiations, consider a short-term contract for dispatchable energy of an undetermined amount to supplement spot market purchases.~~
- Environmental externalities: continue to consider ~~include~~ externalities when making resource decisions.

8.0 ENVIRONMENTAL IMPACTS OF AND MITIGATION FOR ALTERNATIVE SRA RECOMMENDATIONS

8.1 ENVIRONMENTAL IMPACTS ASSOCIATED WITH SRA ISSUES

The following section discusses the potential changes in generation patterns and resulting environmental impacts associated with each of the four SRA issue areas in isolation. It is followed by an analysis of the impacts of the ~~four~~ SRA recommendation alternatives, which integrate the four issues into alternative sets of recommendations SCL might consider.

8.1.1 Conservation Acquisition

Reducing SCL's level of conservation from previously planned levels is likely to result in an increase in the electricity produced by fossil-fueled generating plants and a corresponding increase in their operational environmental impacts. These include emissions of air pollutants such as nitrogen oxides, sulfur oxides, and particulates; emissions of carbon dioxide, a greenhouse gas contributing to the potential for global climate change; water consumption and the discharge of wastewater and waste heat into the environment; and increased consumption of fossil fuels and corresponding fuel extraction and transportation impacts.

The fossil-fueled generating plants that would be expected to run more to make up for lower conservation savings could include SCL's share of the Centralia coal plant and existing coal- and natural gas-fired plants in the Northwest and western U.S. SCL could enter into a firm contract for the necessary power, in which case the relative impacts would depend on the type of resource supplying the power. If SCL were to construct or contract for the output of a new natural gas-fired combustion turbine, there would be additional construction-related impacts but the operational impacts, particularly air emissions, would expected to be lower than existing generating plants because of higher efficiencies and more stringent emission control requirements associated with new generating plants. If SCL were to rely on increased ~~spot~~ market purchases to replace conservation, there would be considerable uncertainty regarding the ultimate source of power and its associated impacts, although it would be expected to be from existing coal and gas-fired generating plants. The amount Centralia would be ~~was~~ used would continue to depend on its operating cost in relation to alternative sources including the energy ~~spot~~ market and BPA.

8.1.2 Level of BPA Power Purchases

The environmental impacts of differing levels of BPA purchases depend in large part on the source of power that SCL would rely on in place of BPA. BPA obtains the power it sells to its preference public power customers, such as SCL, from a variety of sources, but the great majority comes from the federal hydroelectric system on the Columbia River system. However, within the context of the regional and west coast power system in which BPA and SCL operate, the marginal effect of changes in purchases or sales by SCL outside of its system, including purchases from BPA, is to change total fossil fuel generation in the

western United States by a corresponding amount. For example, increases in purchases from BPA are expected to result in equivalent increases in fossil fuel generation, all other things being equal. ~~fossil-fuel-generating resources are typically on the margin, that is, it is their output which varies to respond to changes in demand.~~

Several years ago, ~~Until recently,~~ it appeared likely that new demand placed on BPA by utilities such as SCL would be met by BPA contracting for the output of new combined-cycle combustion turbines. However, BPA's ~~recent~~ loss of direct service industry and public utility load and its decision to cancel its contract for the output of the Tenaska II combustion turbine project call this assumption into question. Instead, it appears that BPA is planning to rely on seasonal ~~spot~~ market purchases to supplement its existing resources.

As a result, increases or decreases in SCL's BPA purchase levels are likely to cause corresponding increases or decreases, respectively, of fossil-fueled generation serving the energy ~~spot~~ market in the Pacific Northwest or western U.S, either directly or indirectly. This effect could occur directly if BPA must increase its ~~spot~~ market purchases to meet SCL's demand, or indirectly if BPA would otherwise sell the power purchased by SCL and as a result displace fossil fuel resources operating on the margin. The source of ~~spot~~ market generation is uncertain but could be either coal- or natural gas-fired plants, depending on what resources are operating on the margin. (To the extent that increased ~~spot~~ market purchases occur at a time when water would otherwise be spilled past hydroelectric generators because water flows exceed generation capacity, then there would be no corresponding increase in the operation of fossil-fuel plants). Therefore, if SCL decreases its existing BPA purchase levels, the net environmental impact would depend on how the source of replacement power compares to an uncertain mix of existing fossil-fuel plants, including both coal and natural gas.

If the replacement power is provided by a firm contract for an existing natural gas-fired resource, such as a combustion turbine, overall impacts would likely be lower than continued BPA purchases because of the avoidance of coal-fired generation. (However, this difference would be lessened to the extent the contracted resource would otherwise have been used to sell to the energy ~~spot~~ market.) If SCL constructs or contracts for the output of a new natural gas-fired combustion turbine, there would be additional construction-related impacts but the operational impacts, particularly air emissions, would be lower because of higher efficiencies and more stringent emission control requirements. If SCL relies on increased ~~spot~~ market purchases to replace existing levels of BPA purchases, then there likely would be little or no net effect on the operation of fossil-fuel plants in the western U.S. and no associated change in significant environmental impacts. ~~However, increasing reliance on spot market purchases may increase SCL's risk that it would not have adequate power supplies in the future as energy resources would no longer be either owned by SCL or under long-term contract with the utility.~~

8.1.3 Gas-Fired Dispatchable Resource

One of the main reasons SCL would contract for the services of a gas-fired dispatchable resource (such as a combined-cycle or simple-cycle combustion turbine) is as a backup

resource so that SCL could make greater use of its own nonfirm hydropower production to reliably serve its own load. Under the concept of "firming nonfirm," SCL could assume for planning purposes that a portion of its nonfirm hydropower is firm energy as long as the utility has another resource available to substitute for the hydropower during low water conditions.

The potential environmental impacts of contracting for the services of a dispatchable resource, likely a combined-cycle or simple-cycle combustion turbine, are expected to ~~be minor and~~ result from two primary factors: (1) the shift in disposition in SCL's nonfirm hydropower, and (2) the expected operation of the dispatchable resource compared to the resource(s) that would have operated otherwise.

The shift in SCL's nonfirm hydropower is expected to result in little change in resource operations and associated environmental impacts. Rather than selling its nonfirm hydropower and displacing others' marginal fossil fuel resources, SCL would use the nonfirm to serve its own load and likely reduce its purchases from BPA and the energy ~~spot~~ market, which would be expected to result in very similar patterns of resource displacement and little net change in environmental impacts.

Regarding the operation of the dispatchable resource, there could be a net decrease in fossil-fuel generation and associated impacts under two circumstances. The first is if SCL's contract and the operation of the dispatchable resource ~~assumed to be a simple cycle combustion turbine,~~ resulted in a net decrease in less efficient, more pollluting gas-fired generation or in coal-fired generation. This would ~~could~~ occur if SCL relied on power from the dispatchable resource instead of market purchases. ~~when others would have purchased coal fired generation instead, for example, through spot market purchases. This is unlikely to occur frequently, because SCL would be relying on the dispatchable resource during periods of low water conditions when regional coal plants likely would be operated at full capacity and more expensive gas fired plants would be the marginal resource.~~ The other circumstance is if SCL contracted for the development of a new dispatchable resource, which would be more efficient and would have to meet more stringent pollution control requirements than existing plants.

8.1.4 Environmental Externalities

Environmental externalities refer to the societal costs of environmental impacts which are not borne by the producers of a product and therefore are not reflected in product prices. SCL has recommended a set of externality cost adders for use in resource planning (SCL, 1994c and SCL, 1996). Their inclusion in the economic evaluation of resource options allows for the consideration of a societal perspective when determining the relative cost-effectiveness of alternative resources.

The potential environmental impacts of including externalities in resource decisions arise from their effect on the outcome of the other three policy issues discussed above. In this context, their effect is to favor ~~would be limited primarily to favoring~~ higher levels of conservation and therefore reduce ~~reducing~~ the impacts associated with construction and

operation of generating resources. Conservation is assumed to have an externality cost of zero, consistent with its having the fewest impacts of any alternative resource type.

With regard to the issues of BPA purchase levels and contracting for a dispatchable resource, the consideration of externalities is likely to favor a dispatchable resource contract over BPA purchases or market purchases because of the potential to displace coal-fired generation with the output of the dispatchable resource.

~~The consideration of environmental externalities is likely to have little potential effect on decisions regarding the other two issues, BPA purchase levels and contracting for a dispatchable resource, because the alternatives result in a relatively small range of potential environmental impacts and associated externality costs.~~

8.2 FRAMEWORK FOR ANALYSIS OF ENVIRONMENTAL IMPACTS OF ALTERNATIVE SRA RECOMMENDATIONS

As with the alternative portfolios discussed in Sections 5.0 and 6.0 of the DEIS, analysis of the environmental impacts of the near-term alternative SRA recommendations requires estimates of the electricity generation from both new and existing resources whose output is expected to vary between alternatives. Of SCL's existing owned resources, only production from Centralia is expected to vary between the alternatives. The output of SCL's hydroelectric system and the amount of power purchased through existing long-term contracts (other than BPA) are assumed to remain constant across the alternatives for any particular year. Changes in the amount of power produced by resources owned or controlled by others can result from SCL purchasing electricity on the energy ~~spot~~ market, selling its own surplus electricity, and varying the amount of BPA purchases. See Section 6.1 of the DEIS for a more detailed discussion of analytical assumptions and modeling used in this analysis.

SCL assumes that no new energy facilities will be constructed within the short-term planning horizon of the SRA and generation plants currently under construction were planned, designed, and permitted without specific purchase commitments from SCL. Thus, the analysis of potential environmental impacts of these alternatives does not include any discussion of direct or indirect construction impacts. Rather, potential environmental impacts would occur solely from direct and indirect operational impacts.

This analysis focuses on the year 1998 to represent the near-term environmental impacts of the alternative SRA recommendations. As described in Section 7.0, SCL has developed ~~four~~ sets of alternative SRA recommendations to satisfy the expected need for energy under the base case load forecast. The anticipated generation of individual resources for each alternative is summarized in Table 8-1 and described below. For analysis of each of the alternatives, the levels of conservation acquisition and BPA entitlement ~~and available capacity of dispatchable resource~~ were set as assumptions. SCL's Integrated Planning Model then determined the expected levels of BPA purchases, operation of Centralia, ~~and the dispatchable resource,~~ energy ~~spot~~ market purchases, and surplus sales. For the two

Table 8-1. Generation by Resource Type for Alternative SRA Recommendations, Year 1998

Resource Type	Alternative SRA Recommendations, Year 1998 (aMW)						
	Alt. A	Alt. B	Alt. C	Alt. D	Preferred	Var. 1	Var.2
BPA Purchase[1/]	171.1	171.5	87.6	88.0	152.5	152.5	152.5
Not Purchased	*(48.9)*	*(48.5)*	*(132.4)*	*(132.0)*	*(67.5)*	*(67.5)*	*(67.5)*
Centralia	75.3	75.3	75.9	75.9	75.5	75.5	75.5
Conservation	26.0[2/]	20.0[3/]	26.0[2/]	20.0[3/]	20.0[3/]	20.0[3/]	20.0[3/]
Market Purchases[1/]	146.1	148.1	183.4	185.7	156.2	136.2	136.2
Combustion Turbine[4/]	—	—	—	—	—	20.0 (CCCT)	20.0 (SCCT)
Total Energy	418.5	414.9	372.9	369.6	404.2	404.2	404.2
Surplus Sales[1/]	248.3	245.1	203.9	201.0	234.6	234.6	234.6

1/ Market purchases, displacement resulting from surplus sales, and changes in BPA purchases from SCL's 1994 entitlement of approximately 220 aMW are assumed equivalent to a melded marginal resource based on 10% existing simple-cycle combustion turbine, 5% existing combined-cycle combustion turbine, 45% existing gas-fired steam boiler generation, 35% existing coal-fired generation, and 5% avoided hydro spill. Increases in BPA purchases result in increased emissions and quantified impacts and reductions in BPA purchases result in corresponding reductions in impacts.

2/ Assumes conservation at levels in 1992 Conservation Implementation Plan (approximately 9 aMW per year).

3/ Assumes conservation at levels in 1996 Energy Management Services Plan (approximately 6 aMW per year).

4/ Variation 1 of preferred alternative includes 20 aMW of energy from a combined-cycle combustion turbine; variation 2 includes 20 aMW of energy from a simple-cycle combustion turbine.

variations of the preferred alternative, 20 aMW of energy from a combined-cycle or simple-cycle combustion turbine, respectively, were substituted for energy market purchases.

As with the alternative portfolios, the source of electricity and the displaced resources are uncertain for energy ~~spot~~ market purchases, changes in BPA purchases, and surplus sales. For this analysis, though, SCL has made specific assumptions regarding the mix of energy ~~spot~~ market resources, described in footnote 1 of Table 8-1.

Alternative A

This alternative relies on 1992 Conservation Implementation (CIP) ~~existing planned~~ conservation levels of 26 aMW through 1998. BPA purchases are estimated at 171.1 ~~134~~

aMW out of an assumed entitlement of 220 aMW. SCL's share of Centralia generation is estimated at 75.3 ~~78~~ aMW, ~~spot~~ market purchases at 146.1 ~~78~~ aMW, and surplus sales at 248.3 ~~147~~ aMW. ~~A dispatchable resource is not acquired under this alternative.~~

This alternative does not exactly correspond with any one of the alternative long-term portfolios described in Chapters 5 and 6, although it is similar to both the Status Quo and Less Environmental Impact portfolios in its maintenance of 1992 CIP ~~existing~~ conservation levels and to the Less Environmental Impact portfolio in the continuation of the 1994 level of entitlement to BPA purchases. ~~It is also similar to the No Action portfolio with the absence of a dispatchable resource.~~

Alternative B

This alternative assumes a reduction in conservation acquisition to approximately 20 ~~19~~ aMW through 1998. BPA purchases are estimated at 171.5 ~~137~~ aMW out of an assumed entitlement of 220 aMW. SCL's share of Centralia generation is estimated at 75.3 ~~78~~ aMW, ~~spot~~ market purchases at 148.1 ~~80~~ aMW, and surplus sales at 245.1 ~~145~~ aMW. ~~A dispatchable resource is not acquired under this alternative.~~

As with Alternative A, ~~Alternative B,~~ this alternative does not exactly correspond with any one of the long-term alternative portfolios. However, it is similar to the Resource Diversity portfolio in its reduction from 1992 CIP ~~in currently planned~~ conservation levels and continuation of the 1994 ~~current~~ entitlement for BPA purchases. ~~Like Alternative A, it is similar to the No Action portfolio in the absence of a dispatchable resource.~~

Alternative C

This alternative relies on 1992 CIP ~~existing planned~~ conservation levels of 26 aMW through 1998. BPA purchases are significantly lower than Alternatives A and B as a result of reduced BPA entitlement; BPA purchases are estimated at 87.6 ~~78~~ aMW out of an assumed entitlement of 110 aMW. SCL's share of Centralia plant generation is estimated at 75.9 ~~79~~ aMW, essentially the same as the previous two alternatives, while ~~spot~~ market purchases increase to 183.4 ~~102~~ aMW. ~~The dispatchable resource with a capacity of 65 MW is estimated to produce 20 aMW.~~ Surplus sales decline somewhat compared to Alternatives A and B to 203.9 ~~134~~ aMW.

As with the previous alternatives, this alternative does not exactly correspond with any one of the long-term alternative portfolios. It is similar to both the Status Quo and Less Environmental Impact portfolios in its maintenance of 1992 CIP ~~existing~~ conservation levels. ~~and the acquisition of a dispatchable resource.~~ It is also similar to the BPA Independence portfolio in its reduction in the level of BPA entitlement.

Alternative D

This alternative assumes a reduction in conservation acquisition to approximately 20 ~~19~~ aMW through 1998. BPA purchases are similar to Alternative C and are estimated at 88 ~~79~~ aMW out of an assumed entitlement of 110 aMW. SCL's share of Centralia plant

generation is estimated at 75.9 ~~79~~ aMW, the same as Alternative C. ~~Spot~~ Market purchases are also very similar to Alternative C at 185.7 ~~103~~ aMW. ~~The dispatchable resource with a capacity of 65 MW is estimated to produce 20 aMW.~~ Surplus sales are slightly lower than Alternative C at 201 ~~131~~ aMW.

As with the previous alternatives, this alternative does not exactly correspond with any one of the long-term alternative portfolios. However, it is similar to the Resource Diversity portfolio in its reduction in 1992 CIP ~~currently~~ planned conservation levels, ~~and the acquisition of a dispatchable resource,~~ and it is similar to the BPA Independence portfolio in its reduction in the level of BPA entitlement.

Preferred Alternative and Variations

The preferred alternative assumes a reduction in conservation levels to approximately 20 aMW through 1998. BPA purchases are estimated at 152.5 aMW out of a maximum purchase level of 195 aMW under the 1996 contract amendment. SCL's share of Centralia plant generation is estimated at 75.5 aMW. Market purchases are estimated at 156.2 aMW, surplus sales at 234.6 aMW. For Variation 1, 20 aMW of energy from a combined-cycle combustion turbine is substituted for an equivalent amount of market purchases. Variation 2 substitutes the same amount of energy from a simple-cycle combustion turbine.

8.3 ANALYSIS OF IMPACTS AND MITIGATION FOR ALTERNATIVE SRA RECOMMENDATIONS

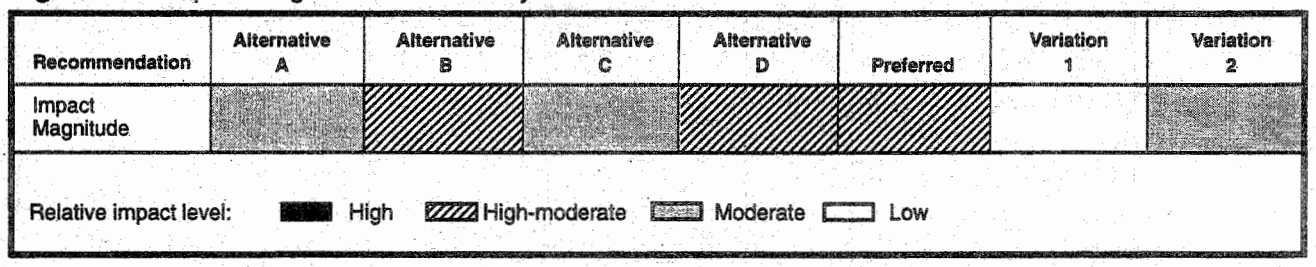
In comparing the alternatives under each of the environmental elements, a four-category system has been used to rate the relative magnitude of impacts. The four categories are the same as those used in ranking the impacts of the individual resource types in Section 4.0 of the DEIS and the alternative long-term portfolios in Section 6.0 of the DEIS: high, high-moderate, moderate, and low. As with the alternative portfolios, the categories apply to the alternative recommendation as a whole, not the individual resource types of which it is composed. The ranking categories have been assigned based on both the relative significance of the impacts involved and the relative magnitude of the impacts between portfolios. In addition, they are based on both quantified and qualitative estimates of impacts.

8.3.1 Air Quality

The SRA alternatives represent combinations of policy recommendations regarding the acquisition of power generating resources. No new construction is planned for the SRA alternatives. All air quality impacts would be related to the operation of existing power generation equipment.

Figure 8-1 summarizes the relative impact magnitude of each of the ~~four~~ alternative recommendations. Air emissions accounted for in this analysis include those from the operation of SCL's share of the Centralia coal-fired plant, the combustion turbines assumed for the variations of the preferred alternative, ~~contracted dispatchable resource, spot~~ market

Figure 8-1. Impact Magnitude—Air Quality



purchases, and displacement of generating plants from SCL's surplus sales and from reductions in BPA purchase levels. Air emissions (in lb/MWh) for the various resources were ~~are~~ presented in Table 6-6 of the DEIS. ~~The dispatchable resource is assumed to have the emission characteristics of a simple cycle combustion turbine.~~ The estimated air emissions for each of the alternatives for the year 1998 are presented in Table 8-2. The calculations underlying these totals are summarized in Appendix C.

Table 8-2. Air Emissions for Alternative SRA Recommendations by Air Pollutant, Year 1998[1/]

	Alternative SRA Recommendations, Year 1998 (tons of pollutant)						
Air Pollutant[2/]	Alternative A	Alternative B	Alternative C	Alternative D	Preferred	Variation 1	Variation 2
CO_2	-210,478	-174,522	-215,982	-180,026	-175,072	-226,117	-188,153
NO_x	-472	-397	-484	-408	-398	-646	-579
SO_2	3,922	3,994	3,945	4,017	4,004	3,754	3,757
Particulates	42	46	42	45	46	36	38
VOCs	-10	-9	-10	-9	-9	-6	-3
CO	-163	-152	-165	-154	-152	-175	-158

1/ Air emissions in this table are cumulative for each alternative SRA recommendation for CO_2 and five air pollutants. Emissions include those produced by energy resources acquired or purchased as well as the air emission offsets by SCL surplus sales and BPA entitlement resources not purchased.

2/ CO_2 = carbon dioxide, NO_x = nitrogen oxides, SO_2 = sulfur dioxide, VOCs = volatile organic compounds, and CO = carbon monoxide.

All sources of air emissions are assumed to comply with all applicable air quality regulations. Because air discharge permits are based on the physical limitations of the plant, increases in the power generated by a particular facility would not result in violations of the air quality regulations.

The differences in air emission between alternatives is primarily due to two factors. The first is conservation. Alternatives A and C, which both have higher levels of conservation,

have correspondingly lower levels of air emissions than the other alternatives. ~~Alternatives B and D, respectively.~~

The second factor is the availability of the ~~a contracted dispatchable resource, assumed to be a simple-cycle~~ combustion turbines in the variations of the preferred alternative. When available, the combustion turbines have ~~this resource has~~ the effect of substituting gas-fired generation for ~~spot~~ market and BPA purchases, which are assumed to be a combination of coal- and gas-fired generation on the margin. Energy from a combined-cycle combustion turbine results in lower air emissions than from a simple-cycle combustion turbine. This is because a combined-cycle turbine is more efficient and typically has more stringent pollution controls. ~~As a result, Alternatives C and D, which have a dispatchable resource available, have lower emissions than A and B, respectively. This is due to the substitution of less-polluting gas-fired generation for some amount of coal-fired generation from BPA and/or the spot market.~~

~~The amount of energy provided by the dispatchable resource (17 and 20 aMW for Alternatives C and D, respectively) is considerably greater than the difference in conservation levels for the alternatives (7 aMW). As a result, the emission reductions from the availability of a dispatchable resource are larger than those from higher conservation levels. Alternative C, which has both the higher conservation level and a dispatchable resource, has the lowest air emissions for all of the pollutants except VOCs and its relative air impacts are considered of low magnitude. (VOC emissions tend to be higher for gas-fired resources than for coal-fired ones, so emission trends for this pollutant generally move in the opposite direction from the others.) Alternative B, on the other hand, has lower conservation and no dispatchable resource and so has the highest air emission levels (again, for all but VOCs) and is judged high moderate. Air emissions from Alternatives A and D lie between the other two and are considered moderate.~~

Alternatives B, D, and the Preferred Alternative have higher air emissions (with the exception of VOCs, discussed below) than the other alternatives because of their lower conservation levels. Their relative air impacts are judged to be high-moderate. Alternatives A and C have lower air emissions due to the higher levels of conservation, and their relative air impacts are judged to be moderate. The 20 aMW from a simple-cycle combustion turbine reduces the air emissions of Variation 2 to a level comparable to Alternatives A and C, making up for the lower level of conservation (6 MW less), and it is also ranked as moderate. Variation 1 has the lowest air emissions of all the alternatives (except for VOCs). This is due to the greater efficiency and lower emission levels of the combined-cycle combustion turbine. (VOC emissions tend to be higher for gas-fired resources than for coal-fired ones, so emission trends for this pollutant generally move in the opposite direction from the others.) The relative air impacts of Variation 1 are judged to be low in magnitude.

The differences in expected Centralia generation between alternatives is relatively small and does not significantly affect the relative air emissions of the portfolios. Finally, the tradeoff between ~~spot~~ market purchases and BPA purchases is expected to have little overall impact on resource operation and resulting air emissions. Instead, it likely results primarily in a

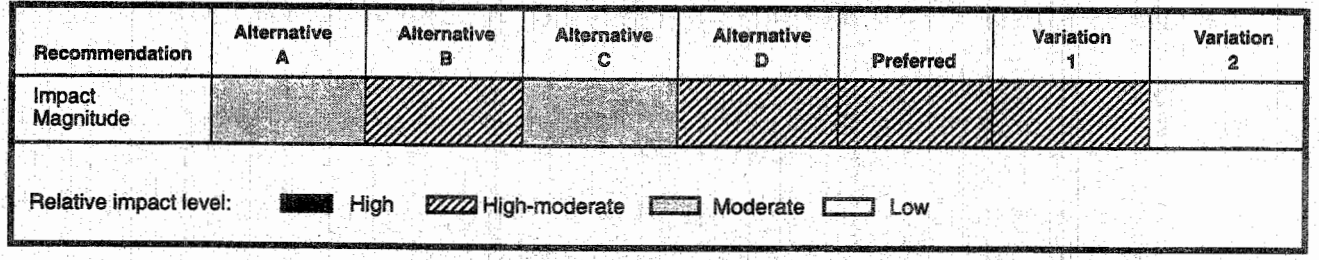
shifting of energy among parties within the region and the west coast power system in response to broader market conditions and regional hydroelectric availability.

8.3.2 Surface and Groundwater

Operations-related impacts could occur to both surface and groundwater quantity and quality, mainly associated with fossil-fuel resources including coal plants and gas-fired generating facilities. These impacts would primarily involve: (1) the depletion of surface and groundwater resulting from the cooling water requirements of these plants, (2) degradation of water quality from the discharge of wastewater, and (3) the discharge of waste heat (thermal discharge) to surface waters.

Figure 8-2 summarizes the relative impact magnitude to surface and groundwater of the alternative recommendations. As with air emissions, higher levels of conservation and the presence of a dispatchable resource both result in reduced impacts. Conservation avoids the water impacts associated with fossil-fuel generation. Energy from combustion turbines ~~the dispatchable resource (assumed to be a simple-cycle combustion turbine)~~ substitutes for some amount of higher-impact coal-fired generation from ~~spot~~ market and BPA purchases. The presence of the simple-cycle combustion turbine in Variation 2 results in the lowest impacts to water resources of any of the alternatives. This is because a simple-cycle combustion turbine, unlike a combined-cycle unit, does not have a steam cycle with the associated water consumption, heating, and wastewater discharge. ~~Again as with air emissions, the presence of a dispatchable resource in Alternatives C and D reduces the amount of surface and groundwater impacts more than conservation does because of the greater amount of energy involved. If the dispatchable resource were a combined-cycle rather than a simple-cycle combustion turbine, there would be less of a difference between the alternatives due to the higher water-related impacts from the combined-cycle technology, which result from water consumption, wastewater discharge, and thermal discharge from the steam cycle.~~

Figure 8-2. Impact Magnitude—Surface and Groundwater



In evaluating the potential surface and groundwater impacts for the SRA alternatives, operations-related impacts were quantified using impact multipliers for water consumption, wastewater discharge, and thermal discharge presented in Section 4.0 of the DEIS and Appendix C.

Table 8-3 compares the quantified potential impacts to surface and groundwater for the ~~four~~ alternative SRA recommendations.

Table 8-3. Comparison of Potential Surface and Groundwater Impacts for Alternative SRA Recommendations, Year 1998

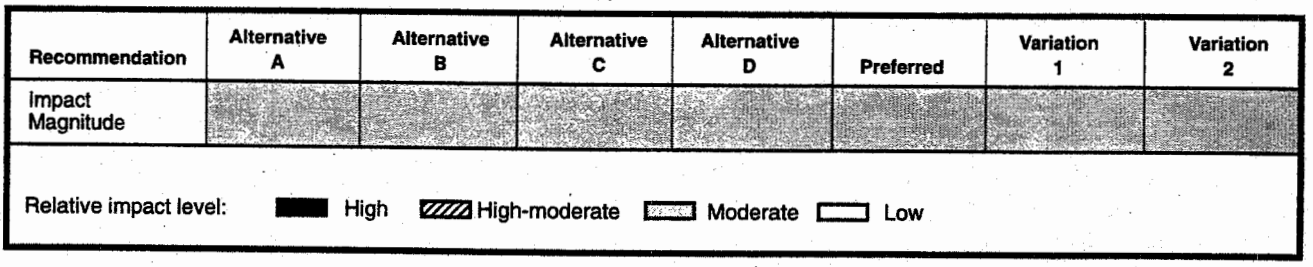
SRA Recommendation	Water Consumption (acre-feet per year)	Wastewater (acre-feet per year)	Thermal Discharge (MMBtu per year)
Alternative A	-20.0	-85.8	-1,229,927
Alternative B	10.5	-77.4	-1,066,575
Alternative C	-23.5	-87.4	-1,257,113
Alternative D	7.1	-79.0	-1,093,761
Preferred	10.5	-77.7	-1,069,803
Variation 1	-30.7	-74.3	-1,077,203
Variation 2	-95.8	-104.7	-1,653,203

8.3.3 Soils and Geology

The potential impacts to soils and geology from the SRA alternatives are described below. Potential operations-related impacts could occur to soils, mainly from land disturbance associated with the mining of coal and the extraction of natural gas for use by coal- and gas-fired generating resources. Impacts would include: (1) soil loss and possible surface water contamination from erosion, and (2) loss of soil fertility and drainage potential from the compaction of soils by heavy vehicles.

Figure 8-3 summarizes the relative magnitude of potential impacts to soils and geology of the alternative recommendations. The differences between alternatives is minor and all are considered to have impacts of moderate magnitude.

Figure 8-3. Impact Magnitude—Soils and Geology



In evaluating the potential impacts from the alternative SRA recommendations, operations-related soils impacts have been quantified for land effects from operations for the various

resources, as presented in Section 4.0 of the DEIS and Appendix C. Impacts among the alternative SRA recommendations differ because of their variations in the amount of land disturbance that could occur in the mix of energy resources.

Table 8-4 presents the quantified estimates of land disturbance for each of the alternatives. As with air emissions, higher levels of conservation and the substitution of combustion-turbine energy for market purchases both ~~and the presence of a dispatchable resource both~~ result in reduced impacts. Conservation avoids the land disturbance associated with fossil-fuel generation. Energy from the combustion-turbines ~~dispatchable resource (assumed to be a simple cycle combustion turbine)~~ substitutes for some amount of higher-impact coal-fired generation from the energy ~~spot~~ market. ~~and BPA purchases. Again as with air emissions, the presence of a dispatchable resource reduces the amount of land disturbance impacts more than conservation does because of the greater amount of energy involved.~~

Table 8-4. Impacts to Soils and Geology for Alternative SRA Recommendations, Year 1998

SRA Recommendation	Operations-Related Impacts (acres per year)[1/]
Alternative A	3.3
Alternative B	3.9
Alternative C	3.3
Alternative D	3.9
Preferred	3.9
Variation 1	2.4
Variation 2	2.4

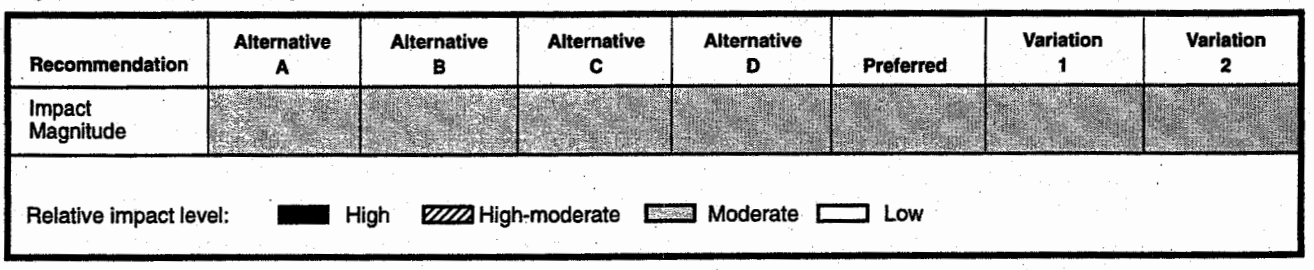
1/ Includes annual natural gas extraction and coal mining.

8.3.4 Plants and Animals

The following section summarizes the predicted qualitative potential impacts to plants and animals from implementation of the ~~four~~ alternative SRA recommendations. In general, all of the ~~four~~ alternatives rely on existing coal-fired and gas-fired energy resources. Thus, potential effects on plants and animals would be associated with the operation of existing fossil-fuel power plants. Differences in effects among alternatives would occur based on relative use of conservation and fossil-fuel resources. These differences appear to be relatively small. In general, all ~~four~~ alternatives could potentially result in indirect, moderate-level operational effects on plants and animals from operation of existing resources.

Figure 8-4 summarizes the relative magnitude of potential impacts to plants and animals of the alternative SRA recommendations.

Figure 8-4. Impact Magnitude—Plants and Animals



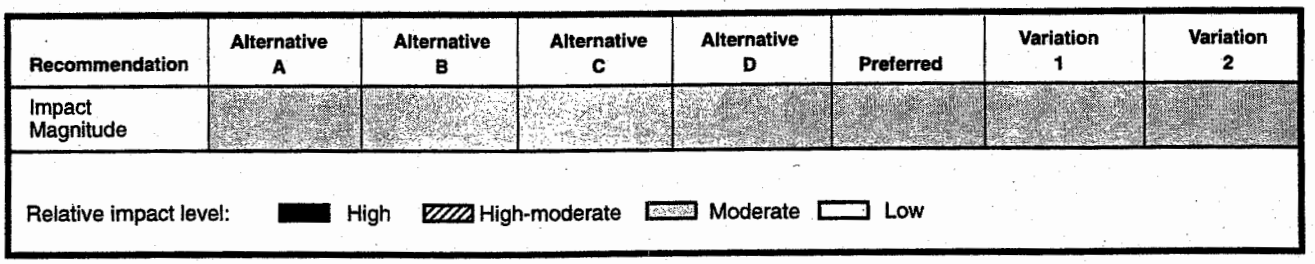
Potential effects due to power plant operation include possible declines in animal and plant populations due to lost or degraded habitats, depending on the occurrence of such species in affected areas. Habitat or individuals could be affected primarily by degradation of water quality (e.g., thermal and contaminant pollution, particularly relevant to fish), reduction of natural water flows of rivers or streams as a result of withdrawal for cooling or other uses, air pollution, and potential oil spills.

8.3.5 Land Use

Potential operations-related land use impacts could occur, mainly from land disturbance associated with the mining of coal and the extraction of gas for use by coal- and gas-fired generating resource. Impacts would include temporary and permanent alteration of land use and permanent conversion of land.

Figure 8-5 summarizes the relative magnitude of potential impacts to land use of the alternative recommendations. The differences between alternatives are minor and all are considered to have impacts of moderate magnitude.

Figure 8-5. Impact Magnitude—Land Use



In evaluating potential impacts from the alternative SRA recommendations, operations-related land use impacts have been quantified using multipliers for land effects from

operations for the various resources, as presented in Section 4.0 of the DEIS and Appendix C. Impacts among the alternative SRA recommendations differ because of variations in the amount of land disturbance.

Table 8-5 presents the quantified estimates of land disturbance for each of the alternatives. As with air emissions, higher levels of conservation and the substitution of combustion-turbine energy for market purchases ~~and the presence of a dispatchable resource~~ both result in reduced impacts. Conservation avoids the land disturbance associated with fossil-fuel generation. Energy from combustion turbines ~~the dispatchable resource (assumed to be a simple-cycle combustion turbine)~~ substitutes for some amount of higher-impact coal-fired generation from the energy ~~spot~~ market, ~~and BPA purchases. Again as with air emissions, the presence of a dispatchable resource reduces the amount of land disturbance impacts more than conservation does because of the greater amount of energy involved.~~

Table 8-5. Land Use Impacts for Alternative SRA Recommendations, Year 1998

SRA Recommendation	Operations-Related Impacts (acres per year)[1/]
Alternative A	3.3
Alternative B	3.9
Alternative C	3.3
Alternative D	3.9
Preferred	3.9
Variation 1	2.4
Variation 2	2.4

1/ Includes annual natural gas extraction and coal mining.

8.3.6 Employment

There would be no significant adverse environmental impacts on employment for 1998 from any of the alternative SRA recommendations. No new construction is assumed in the near future resulting from SCL actions, and no new construction jobs would be created. No new employment opportunities would be available from the operation of existing generating facilities.

Employment opportunities per aMW from new conservation programs are considerably more than the employment from fossil fuel extraction and transportation. Therefore Alternatives A and C, which have higher levels of conservation acquisition, would have greater employment opportunities. Such jobs are more likely to be in or near the utility service territory. Figure 8-6 summarizes the relative impact magnitude to employment of the alternative SRA recommendations.

Figure 8-6. Impact Magnitude—Employment

Recommendation	Alternative A	Alternative B	Alternative C	Alternative D	Preferred	Variation 1	Variation 2
Impact Magnitude	Beneficial		Beneficial				
Relative impact level:	High	High-moderate	Moderate	Low			

8.3.7 Aesthetics and Recreation

Because no new construction would occur for any of the alternative SRA recommendations, there would be no direct or indirect construction-related potential adverse impacts to aesthetics and recreation. Impacts from the operation of existing facilities are not expected to differ significantly between the alternatives and are considered low. Figure 8-7 summarizes the relative magnitude of potential impacts to aesthetics and recreation of the alternative SRA recommendations.

Figure 8-7. Impact Magnitude—Aesthetics and Recreation

Recommendation	Alternative A	Alternative B	Alternative C	Alternative D	Preferred	Variation 1	Variation 2
Impact Magnitude							
Relative impact level:	High	High-moderate	Moderate	Low			

8.3.8 Environmental Health

Potential impacts to environmental health would vary between alternatives primarily as a result of differences in conservation levels and corresponding variation in the operation of fossil-fuel resources. Alternatives B and D and the Preferred Alternative, with lower conservation levels, would be expected to have somewhat increased environmental health effects from increased air emissions, although the magnitude of the difference is not significant. Increased generation from existing fossil fuel plants is not expected to significantly increase ambient noise levels. Overall impact levels are expected to be moderate for all ~~four~~ alternatives. Figure 8-8 summarizes the relative magnitude of impacts to environmental health of the alternative SRA recommendations.

Figure 8-8. Impact Magnitude—Environmental Health, Including Noise

Recommendation	Alternative A	Alternative B	Alternative C	Alternative D	Preferred	Variation 1	Variation 2
Impact Magnitude							

Relative impact level: High High-moderate Moderate Low

8.3.9 Cultural and Historical Resources

Because no new construction is proposed in any of the four alternative SRA recommendations, no associated direct adverse effects are expected on cultural and historical resources. Potential indirect operational effects on cultural and historical resources consist of coal-fired plant emissions that contribute to acid rain, which corrodes metallic and masonry components of buildings and other historic artifacts. In addition, excavation and extraction of natural gas, fuel oil, and coal could indirectly impact cultural resources. However, such indirect impacts would depend on the occurrence and proximity of such resources in affected areas and are difficult to assess and compare between alternatives.

In general, increased reliance on conservation and/or contracting for a dispatchable gas-fired resource are likely to result in decreased coal-fired air emissions from ~~spot~~-market purchases. Alternatives with those features would be expected to have less potential indirect impacts to historical buildings and artifacts. However, the difference in impacts between alternatives is not significant and the impact level for all ~~four~~-alternatives is considered low. Figure 8-9 summarizes the relative magnitude of impacts to cultural and historical resources of the alternative SRA recommendations.

Figure 8-9. Impact Magnitude—Cultural and Historical Resources

Recommendation	Alternative A	Alternative B	Alternative C	Alternative D	Preferred	Variation 1	Variation 2
Impact Magnitude							

Relative impact level: High High-moderate Moderate Low

8.3.10 Energy Resources

Figure 8-10 summarizes the relative magnitude of potential impacts to energy resources of the alternative recommendations. The differences between alternatives is minor and all are considered to have impacts of moderate magnitude.

Figure 8-10. Impact Magnitude—Energy Resources

Recommendation	Alternative A	Alternative B	Alternative C	Alternative D	Preferred	Variation 1	Variation 2
Impact Magnitude							

Relative impact level: High; High-moderate; Moderate; Low

Table 8-6 presents the quantified estimates of fossil fuel consumption for each of the alternatives. Higher levels of conservation result in reduced fossil fuel consumption. Variations 1 and 2 of the Preferred Alternative, which include energy from combustion turbines, ~~Alternatives C and D, which include a dispatchable resource (assumed to be a simple cycle combustion turbine),~~ consume more natural gas and less coal than the other alternatives as a result of the substitution of gas-fired resources for some amount of coal-fired generation from energy ~~spot~~ market and BPA purchases.

Table 8-6. Fuel Usage for Alternative SRA Recommendations, Year 1998

SRA Recommendation	Natural Gas (thousand cubic feet per year)	Fuel Oil (thousand gallons per year, as backup)	Coal (tons per year)
Alternative A	-7,852,365	0	167,693
Alternative B	-7,561,344	0	178,658
Alternative C	-7,945,907	0	167,862
Alternative D	-7,654,886	0	178,827
Preferred	-7,582,131	0	179,106
Variation 1	-7,406,311	480	139,946
Variation 2	-6,810,051	700	139,946

8.4 SALE OR LOSS OF SEATTLE CITY LIGHT'S EXISTING RESOURCES

The Draft Strategic Resources Assessment included ~~includes~~ a recommendation to reevaluate SCL's existing resource base to decide whether changes should be made. Such a reevaluation is prompted by ongoing changes in the structure and regulation of the electric utility industry and by the possibility that the drastic reductions in recent years in the cost of alternative sources of electricity could continue into future years. SCL's resource base was ~~is~~ described in greater detail in Section 1.0 of the DEIS. As described in Section 5.0 of the DEIS, the analysis of alternative resource portfolios and alternative recommendations assumes SCL's continued ownership and operation of those resources it currently owns, such as the Skagit and Boundary Hydroelectric projects and its Centralia coal plant share. It also assumes continuation of existing long-term power sales contracts until but not beyond their expiration. The following section qualitatively addresses the potential environmental impacts associated with SCL's decision to sell or otherwise dispose of an existing owned or contracted resource. It begins with a general discussion, and then more specifically addresses two representative resources: Centralia and Lucky Peak.

8.4.1 Environmental Impacts of the Sale of an Existing Resource

The answers to two key questions determine the environmental impacts of SCL's sale of an existing resource. First, what difference would there be in the operation of the resource because of the change in ownership? Second, what difference would there be between the alternative resource the purchaser would have acquired and the resource SCL acquires as a replacement. For each of these two factors, referred to below as resource operation and alternative resource acquisition, there are three possible outcomes: (1) no difference; (2) the sale results in greater environmental impacts; and (3) the sale results in fewer ~~less~~ environmental impacts.

Differences in resource operation are likely to depend on the purchaser's load shape, resource mix and contractual rights and obligations as compared to SCL. These factors will influence when the resource's output is needed, when its output can be displaced by less expensive sources, and the degree to which its generation can be stored for later use. For example, a purchaser with no hydroelectric resources will not have nonfirm or surplus hydroelectricity with which to displace the purchased resource. Conversely, a purchaser with power sales contracts with take-or-pay provisions or high availability charges (levied for the right to purchase power, even if it is not taken) may find it economical to displace the purchased resource with that power.

In addition, resources with less flexible operation will by definition be less likely to have their operation affected by a change in ownership. For example, run-of-the river hydroelectric plants have limited capabilities to store water and must generate electricity with available flows. The operation and generation patterns for such a resource are likely to be similar regardless of who owns it. At the other extreme, a dispatchable resource such as a combustion turbine can be operated very flexibly to match the loads and system needs of a particular owner.

Differences in alternative resource acquisition are inherently uncertain at this programmatic level of analysis. However, for both SCL and a potential purchaser, a likely range includes conservation as the resource with the least environmental impact through ~~spot~~ market purchases as that with the greatest environmental impacts. ~~Spot~~ Market purchases are likely to include a mix of existing fossil fuel resources at the margin, including coal and natural gas. (New natural gas-fired resources, which would be more efficient and required to meet more stringent pollution control requirements, would fall between conservation and ~~spot~~ market purchases in the severity of their impacts. Renewables such as wind and geothermal would have different types of impacts not directly comparable to fossil-fuel resources. Development of new resources of any kind would have construction-related impacts, while reliance on existing resources would not.)

Given this range, the greatest impacts would result from a combination of the purchaser foregoing conservation and SCL relying on ~~spot~~ market purchases as a replacement. The least serious environmental impacts would result if the purchaser would have otherwise relied on ~~spot~~ market purchases and SCL acquired additional conservation to replace the resource.

8.4.2 Existing SCL Resources

Given the uncertainty regarding potential buyers were SCL to propose sale of an existing resource, the following discussion is necessarily general and focuses exclusively on potential changes in resource operations.

8.4.2.1 Centralia

SCL currently owns an eight percent share of the Centralia coal-fired steam plant. The plant has consistently been in compliance with existing emission control limitations ~~environmental regulations~~ and currently provides reliable power at moderate cost. However, along with the general economic considerations applicable to all existing resources, several factors may cause SCL to reconsider its ownership position. These include ~~public concern over~~ the environmental impacts of coal-fired generation; foreseeable increased capital expenditures and operational costs to meet the requirements of the 1990 Clean Air Act Amendments, including more stringent control of sulfur dioxide and nitrogen oxides; and uncertainty regarding future environmental regulation, particularly the possible imposition of taxes or limitations on carbon dioxide emissions.

Various individuals and organizations have raised concerns regarding the health effects of plant emissions, particularly sulfur dioxide. While no definitive evidence is available linking plant emissions to specific health problems, Centralia emissions do contribute to increased ambient concentrations of various air pollutants, both directly and indirectly, which may have adverse health impacts. Although the area surrounding Centralia currently meets all of the federal Ambient Air Quality Standards, the Environmental Protection Agency has proposed tightening both the ozone and particulate standard based on scientific research showing adverse health impacts at levels below the current standards.

PacifiCorp, the plant operator and 47.5% owner, is currently managing a health effects study to determine the plant's contribution to ambient concentrations of sulfur dioxide and fine particles and to determine the effect on ambient concentrations and human health of reducing the plant's emissions. The study, which will be peer reviewed, is expected to be completed and made available to the public in July 1997.

The Centralia plant's sulfur dioxide emissions contribute to visibility impairment and acid deposition. In August 1995 the Southwest Air Pollution Control Agency (SWAPCA) issued a Reasonably Available Control Technology (RACT) Order requiring reductions in sulfur dioxide emissions at Centralia beginning in 2002. Representatives of the federal land management agencies, particularly the National Park Service, raised concerns that the emissions reductions were not adequate to protect visibility at Mount Rainier National Park. In early 1996 a group was convened to discuss additional reductions in sulfur dioxide emissions, consisting of the Centralia plant owners, federal land management agencies and air quality regulatory agencies including SWAPCA, the Washington Department of Ecology and the US Environmental Protection Agency. In December 1996 the group, which came to be known as the Collaborative Decision-Making group (CDM), announced its final target solution. The solution, which is contingent on a package of tax incentives currently awaiting the Governor's signature, calls for an annual limit of 10,000 tons per year of sulfur dioxide beginning in 2003.

It is expected that sale of Centralia to another owner would have a relatively minor effect on its pattern of generation and corresponding environmental impacts, for two main reasons. First, while a utility or other purchaser with hydroelectric resources would tend to displace Centralia generation more than a thermal-based utility when water was plentiful (and less when it was not), broader market conditions (typically dictated by regional water conditions and transmission availability) are likely to play a more significant role in its operation, regardless of ownership. For example, even if SCL has surplus hydropower available, its decision about whether or not to use it to displace Centralia is based on the energy ~~spot~~ market price it can be sold for. Second, Centralia's relatively low run cost means that it will be economical for any owner to displace it under only the lowest-price market conditions, again regardless of ownership.

8.4.2.2 Lucky Peak Hydroelectric Project

Under a 50-year contract commencing in 1988, SCL purchases all the output of the Lucky Peak power project, which is located at the Corps of Engineers' Lucky Peak Dam near Boise, Idaho. The dam releases irrigation water and provides flood protection to the Boise area. The contract was signed at a time when estimates of avoided cost—the cost of alternative power—were considerably higher than they are currently, and the power from the project is now quite expensive compared to market sources and potential new resources.

Because the reservoir is operated primarily for irrigation and flood control purposes, the project has little operational flexibility, producing when water is released under the direction of the Army Corps of Engineers and Bureau of Reclamation. Therefore, a

transfer of the contractual rights to the power would be expected to have no effect on project operations and no adverse environmental impacts.

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9.0 GLOSSARY

anadromous

Fish that hatch in freshwater, migrate to the ocean, mature there, and return to freshwater to spawn. For example, salmon or steelhead trout.

average megawatt (aMW)

Energy produced by the continuous operation of one megawatt of capacity over a specified period, typically a year. If the actual energy level varies throughout the year, average megawatts can be computed as the sum of all megawatt-hours divided by the number of hours in the time period. In this EIS, aMW is equivalent to an annual average megawatt (or MW-year) and 8,760 MWh.

baseload

Operation of a plant continuously except for scheduled maintenance or outages.

Biological Opinion

A ruling of the National Marine Fisheries Service intended to protect endangered fish; the 1995 Biological Opinion requires increased spill and increased spring flow levels to hasten the downstream migration of young salmon; as a result, some hydro projects lose firm energy output and the ability to shape energy from low- to high-value periods.

Bonneville Power Administration (BPA, Bonneville)

The federal agency that markets power from federally owned projects and projects acquired under terms of the Northwest Power Planning Act.

Btu

British thermal unit. The amount of heat energy necessary to raise the temperature of one pound of water by one degree Fahrenheit. 3,413 Btus are equal to one kilowatt-hour.

capacity

The maximum power that can be produced by a generating resource under specified conditions. The capacity of generating equipment is expressed in kilowatts (kW) or megawatts (MW).

carbon dioxide

An emission from the combustion of fossil fuels that may be linked to global warming.

coal gasification

The process of converting coal to a synthetic gaseous fuel. The process used in integrated gasification combined-cycle (IGCC) plants.

cogeneration

The simultaneous production of electricity and useful heat energy from a common fuel source.

combined-cycle combustion turbine (CCCT)

The combination of a gas turbine and a steam turbine in an electric generation plant; the waste heat from the gas-turbine cycle provides heat for the steam-turbine cycle.

combustion turbine (CT)

A turbine-engine generator, turned by exhaust gases rather than heat-created steam, used to generate electricity.

conservation

Reductions in the use of electricity through improvements in end-use efficiency.

critical period

The sequence of low water conditions during which the regional hydropower system's least amount of energy can be generated (see "critical water") while drafting storage reservoirs from full to empty. Under the Pacific Northwest Coordination Agreement, critical period is based on the lowest multimonth streamflow observed since 1928. Based on analysis of streamflows at the Dalles Dam, this is also the lowest streamflow since recordkeeping began in 1879.

critical water

The sequence of streamflows in the critical period under which the hydropower system will generate about 12,500 average megawatts. In an average year, the Northwest hydropower system will produce about 16,600 average megawatts.

discount rate

The rate used in comparing values observed at different points in time.

dispatch

Operating control of an integrated electrical system involving operations such as control of the operation of specific power plants, high-voltage lines, substations, or other equipment.

dispatchable

Resources which the utility has control over when the resource is generating, and at what level of generation.

distribution

Electric equipment which takes power from the transmission system and transports it directly to the customer's delivery point. Includes equipment from the substation to the customer's meter.

energy
Total amount of electricity needed or used to serve customers over a period of time.

entitlement (BPA)
The right to buy from BPA an amount of power equal to the difference between a utility's own firm resources and its firm load.

environmental dispatch
A way to dispatch the utility's generating plants which assumes that the operating cost of each plant includes an additional amount representing environmental externality values, even though the utility does not have to pay that environmental cost.

externalities (or environmental externalities)
Societal costs not reflected in the price of a product.

firm energy
The minimum energy that can be relied upon 90 percent of the time.

firm (capability)
The minimum resource capability that can be relied upon 90 percent of the time.

fossil fuels
Coal, oil, natural gas, and other fuels derived from fossilized geologic deposits.

fuel switching
A customer changing energy-using equipment from one fuel source to another. Typically, this is thought of as a residential customer changing a water heater or space-heating equipment from electricity to natural gas.

gasifier
Part of integrated gasification combined-cycle which takes pulverized coal and produces an intermediate Btu gas.

generation
The process of producing electricity from other forms of energy (from falling water, coal, gas, wind, solar, or other energy sources).

geothermal fluids
Natural underground moisture that contains the heat used for geothermal energy.

heat rate
The amount of input (fuel) energy required by a power plant to produce one kilowatt-hour of electricity. Expressed as Btu/kWh.

integrated gasification combined cycle (IGCC)

A combined-cycle combustion turbine (CCCT) which uses, instead of natural gas, coal that has been gasified as its source of fuel.

interruptible

Load that, by contract, can be interrupted in the event of a power supply deficiency. Typically, a contract between an individual customer and the company specifies the conditions under which the customer's load can be interrupted, in exchange for lower rates to the customer or specific payments to the customer.

kilowatt (kW)

A unit of electrical energy use. The amount of power being used or produced at one moment in time. Used as a measure for peak or capacity. One kilowatt will light up ten 100-watt light bulbs.

kilowatt-hour (kWh)

A unit of electrical energy use. The amount of energy used over a specified time period, typically one year, measured in kilowatts.

load

The amount of electricity used by a customer or group of customers during a specified time period.

load growth

The increase in demand for electric power that occurs over time as new customers move into an area and new uses for electricity are adopted.

market purchases

Short-term power purchases (for a few hours up to a year) generally arranged with short notice. These include any purchases of electricity from commodity energy markets other than long-term purchase contracts, which are generally defined as those at least one year in duration.

megawatt (MW)

A unit of electric power equal to 1,000,000 watts or 1,000 kilowatts. The amount of power being used or produced at one moment in time. Used as a measure for peak or capacity.

megawatt-hour (MWh)

A unit of electrical energy use. The amount of energy used over a specified time period, typically one year, measured in megawatts.

MMBtu

Millions of British thermal units or Btus.

model

A theory that is intended to capture the workings of the real world. A model used for electricity resource planning is intended to capture all of the factors that utilities consider in making resource acquisition decisions. It attempts to put into rules how each of these factors affects resource decisions, and how they interrelate.

nonfirm

Any production above the firm capability of a resource.

Northwest Power Planning Council

A federally chartered council comprising Oregon, Washington, Idaho, and Montana that establishes policy on Northwest electrical energy and related fish and wildlife issues.

Pacific Northwest Coordination Agreement

Agreement signed in 1964 between owners of major hydropower resources governing water releases and signatory rights and obligations; intended to maximize usable energy after nonpower requirements are met.

peak demand

The maximum rate of electrical power required during a specified unit of time.

photovoltaic

Solar technology that directly converts sunlight into electricity.

pulverized coal plant

Conventional coal plant, which uses a subcritical steam boiler that burns subituminous coal.

pumped storage

A generation technology which uses water in two reservoirs. The water is allowed to fall from the higher reservoir into the lower reservoir, passing through turbines and generators on the way, producing electricity. It is then pumped back up to the upper reservoir, using power from another power plant.

reliability

The ability of a system to provide customers with uninterrupted power at their point of service.

renewable resource

A resource that uses solar, wind, water (hydro), geothermal, biomass or similar sources of energy, and is used either for electric power generation or for reducing the electric power requirements of a customer.

resource planning

The process of predicting the future electricity and energy service needs of customers, and planning which new resources should be used to provide the services required.

resource supply

The system of generating plants available to a utility to meet the electricity needs of its customers.

retail wheeling

Rather than taking service from the utility in its own service area, a retail customer contracts with a utility in another designated service area to provide electricity. This requires the first utility to provide wheeling services to deliver the power to the customer.

~~**spot purchases**~~

~~Short-term power purchases (typically for a few hours to a few days) arranged with short notice (from a few hours to a day).~~

transmission

Electrical equipment which takes power from generating plants and transports it over long distances to a load area. At a substation it is delivered to the distribution system.

watt

A basic unit of electrical power equal to 0.00134 horsepower.

wheeling

Transmission of electricity from one party to another over a third party's transmission system.

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11.0 PUBLIC COMMENT AND RESPONSE

This chapter includes all comments received on the DEIS. Each specific comment is identified and a response is given. Comments expressing an opinion are responded to by "comment acknowledged." Comments containing information related to the project but not needing additional information are responded to by "comment noted."

Comments Received

1. Washington State Office of Archaeology and Historic Preservation
2. National Parks and Conservation Association
3. Gregory H. Bowers
4. Northwest Environmental Advocates
5. The Mountaineers
6. Renewables Northwest Project

Seattle City Light held a public hearing, as required by SMC 25.05.535(B), on April 23, 1996 in the Elliott Bay Room of the Alaska Building in downtown Seattle. The only person who provided comments was Phil Pearl, Pacific Northwest Regional Director of the National Parks and Conservation Association. A written summary of his verbal comments, which he provided, is included as comment #2 above.

LETTER 1

STATE OF WASHINGTON
DEPARTMENT OF COMMUNITY, TRADE AND ECONOMIC DEVELOPMENT
OFFICE OF ARCHAEOLOGY AND HISTORIC PRESERVATION
111 21st Avenue S.W. • P.O. Box 48343 • Olympia, Washington 98504-8343 • (360) 753-4011

April 19, 1996

Mr. Gary Zarker, Superintendent
Attn: Glenn Atwood, Project Manager
Seattle City Light
700 5th Avenue, Suite 3100
Seattle, Washington 98104-5031

Log: 040996-01-KI
Re: Draft Strategic Resources Assessment & Draft EIS, Seattle City Light

Dear Mr. Zarker:

Thank you for sending the Washington State Office of Archaeology and Historic Preservation (OAHP) a copy of Seattle City Light's (SCL) Draft Strategic Resources Assessment (SRA) and Draft Environmental Impact Statement (DEIS). On behalf of OAHP, I have taken the opportunity to review both the SRA and the DEIS in regard to potential impacts upon cultural resources including archaeological, historic, and traditional cultural properties. Following this review, I submit the following comments:

(A) * First, I generally concur with the recommendations and the potential impacts to cultural resources identified in the SRA and DEIS.

(B) * Second, I recommend that the documents recognize the need for SCL to consider the effect of certain energy conservation measures on historic properties. The city of Seattle has many historic residences, apartment buildings, plus commercial and industrial properties which could benefit from conservation measures. However, it is important to recognize that some weatherization measures (such as window replacement) may be inappropriate or need to be applied with discretion. Therefore, if SCL decides to continue weatherization measures, it is my recommendation that a special program be tailored specifically for historic properties. Such a program should include, at a minimum, technical expertise and funding for energy conservation measures meeting the *Secretary*

Ⓑ *of the Interior's Standards for Rehabilitation.* Coordination of this program should also be conducted with the city's Office of Urban Conservation and OAHP to make property owners aware of other historic preservation tax incentives available for historic properties.

Ⓒ * Third, SCL is to be commended for its stewardship of its historic properties at the Skagit Project. I strongly encourage SCL to continue its management of the historic properties at Skagit in keeping with historic character.

Ⓓ * Finally, in regard to new energy facilities, I want to reiterate the need for SCL to consider the impact of such facilities on cultural resources. Recognition of this need by SCL is made clear in the DEIS. I want to add the need for SCL to consider the impact of new energy facilities on traditional cultural properties and cultural/historic landscapes.

This concludes my comments. Again, thank you for the opportunity to review and comment on these documents. Should you have any questions, please feel free to contact me at (360) 753-9116.

Sincerely,

Greg Griffith

Gregory Griffith
Comprehensive Planning Specialist

GAG:tjt

cc: Karen Gordon, Office of Urban Conservation

Letter 1: Washington State Office of Archaeology and Historic Preservation

Comment A Comment acknowledged.

Comment B Currently, Seattle City Light offers window retrofit services to electrically heated multifamily buildings. This consists of providing an incentive to install weatherization measures and a loan for costs not covered by the incentive portion of the program. SCL conservation programs do not fund window measures for commercial or industrial buildings, nor for single-family residential structures. There are five Historic Districts within the Seattle City Light service territory and staff is aware of the geographic boundaries of these designated areas. Program staff have been given presentations on State and City historic building requirements.

If the owner of a building within one of the Historic Districts approaches SCL for weatherization assistance, several check points are required before proceeding with the work. SCL must receive a letter from the Historic District's Public Development Association indicating that the work has been approved. Then the Department of Neighborhoods' Urban Conservation unit reviews the work orders for compliance with historic preservation requirements prior to any work being accomplished. Only after these steps have been taken does SCL provide financial assistance for installing weatherization measures.

Where a property is not located in a Historic District and it appears to have historical significance, SCL staff will ask the property owner whether it has received any historical designation and if they have considered nominating the property for historical designation. This inquiry is made as part of the initial building energy survey accomplished by the staff. If the building has received historic designation or appears to have potential for historic designation, then during the energy survey the building owner is referred to the state Office of Archaeology and Historic Preservation and is made aware of window treatment options that are consistent with historic building requirements. These consist of using certain wood-framed windows rather than the more common, and affordable, vinyl-frame windows.

Comment C Comment noted. Thank you for the compliment.

Comment D The discussion of cultural resources in the DEIS and FEIS is intended to include both traditional cultural properties and cultural/historic landscapes. The text in Section 2.9 (Affected Environment, Cultural and Historical Resources) has been revised to reflect this.

LETTER 2

COMMENTS TO
SEATTLE CITY LIGHT
HEARINGS ON THE STRATEGIC RESOURCE ASSESSMENT
DRAFT ENVIRONMENTAL IMPACT STATEMENT
APRIL 23, 1996

INTRODUCTION

My name is Phil Pearl and I am the Pacific Northwest Regional Director of the National Parks and Conservation Association (NPCA). On behalf of NPCA's more than 450,000 members, over 10,000 of whom reside in western Washington, I appreciate the opportunity to comment this evening on the Strategic Resource Assessment/Draft Environmental Impact Statement (DEIS). I will direct my comments specifically to the DEIS's reference to the Centralia Power Plant on page 8-18 and to Seattle City Light's 8% ownership of this plant.

COMMENTS

The Centralia Power Plant is the largest emitter of sulfur dioxide in the western United States and is responsible for 50% of the sulfur dioxide in western Washington. In 1993 the plant emitted 63,900 tons of sulfur dioxide. The 1996 estimate is 84,000 tons. This emission is expected to grow to approximately 94,000 tons/year by the year 2000.

The Centralia Power Plant has, for nearly 30 years, significantly impacted the air quality of western Washington. More recently, numerous studies have shown a significant impact of air quality related values within the Class One Areas of Mt. Rainier National Park and its adjacent wilderness. These impacts are in conflict with the 1990 Clean Air Act amendment (ACT), as well as the National Park Service Organic Act which requires that the resource be managed in an "unimpaired" condition. Ⓐ

The Act requires more stringent control of sulfur dioxide and other pollutants. The Reasonably Available Control Technology (RACT) order now under consideration proposes to reduce emissions to 55,000 tons/year. This is a relatively small reduction, one that falls considerably short of the reductions necessary to alleviate impacts on

Class One Areas pursuant to the ACT. In the absence of a RACT that complies with the ACT, the review process will undoubtedly be elevated to the Best Available Retrofit Technology (BART) process.

It is with this background that NPCA finds your comments on page 8-18 of the DEIS troubling. To say that "... the plant is ***in compliance*** with existing environmental regulations and currently provides reliable power at moderate costs..." followed by "...***public concerns*** over environmental impacts over coal fire generation..." suggests that there is not really an environmental problem - just a perceived one. This is misleading.

Ⓐ

The fact of the matter is that the Centralia Power Plant could not be licensed today under the Clean Air Act or its amendments, nor is it likely to be in compliance with the RACT now under consideration.

The issue is not ***"public concern"***. The issues are public health, impacts on Class One Areas and the requirements of law.

In conclusion, we urge Seattle City Light to amend page 8-18 of the DEIS to reflect the very real environmental problems caused by the Centralia Power Plant. We also urge Seattle City Light to consider - in its upcoming business decisions - the environmental degradation and Class One Area impacts caused by the plant, as well as the potential costs of a protracted BART process.

Letter 2: National Parks and Conservation Association

Comment A Please refer to Section 8.4.2.1 Centralia, which has been revised to include additional information regarding the regulatory status of Centralia and the potential adverse environmental impacts of its ongoing operation.

According to data obtained from continuous emission monitors (CEMs) and reported to the Environmental Protection Agency (EPA) and other air regulatory agencies, Centralia emitted 78,272 tons of sulfur dioxide in 1996. EPA has acknowledged problems with CEM methodology which result in sulfur dioxide emission measurements that are 5 to 30% higher than calculated emission rates based on the sulfur content and heat content of coal. Using such calculations, Centralia's 1996 emissions are estimated at 69,000 tons.

PacifiCorp's current estimates of Centralia sulfur dioxide emissions in 2000 is approximately 77,400 tons, assuming a capacity factor of 70%, and 83,050 tons assuming a capacity factor of 85%. The 94,000 ton estimate cited in the comments is likely from the Reasonable Available Control Technology document submitted to the Southwest Air Pollution Control Authority in 1995 and was based on an 85% capacity factor.

LETTER 3

G.H. BOWERS ENGINEERING
Consultations on Power System Planning

1930 North 122nd Street, Seattle, Washington 98133 Fax: (206) 361-0461 Telephone: (206) 361-0461

April 30, 1996

Gary Zarker, Superintendent
Attn: Glenn Atwood, Project Manager
Seattle City Light
700 Fifth Avenue, Suite 3100
Seattle, WA 98104-5031

Re: Strategic Resources Assessment (SRA) and DEIS

Mr. Zarker:

Studies by the U.S. EPA and others fully establish that the emissions coming from the Centralia power plant cause enormous suffering and numerous deaths. These citations have been presented to Seattle City Light. The only responsible action you (A) can take is to immediately shut off your coal plant until control equipment is added. Rather than fight me, Seattle should join my efforts to stop this attack on the citizens of the Northwest.

I am not a lawyer, but it is my view that those who seek to cover up (by failing to report or otherwise) the health impacts caused (B) by their operations bear a heavy moral and legal responsibility for the lives of the children and others cut short by their inaction.

In related actions, the DEIS proposes that environmental adders (C) in dispatch not be used unless others do so (DEIS, p.3). Such action reveals, at best, a lack of concern for the well being of Seattlites. Your policy of "utility first and citizens second" (D) has no place in a public utility or society at large. The SRA DEIS also misrepresents the EMF danger. Model data is overly (E) relied on and inadequately supported throughout the SRA and DEIS.

Since I was on the Citizen Technical Review Committee and have challenged your Centralia operations to the Pollution Control Hearings Board, you are well aware of the details of these and other issues that I raise.

Sincerely,

Gregory H. Bowers

Gregory H. Bowers, P.E.

sradeis

cc: Skinnarland

Letter 3: Gregory Bowers, P.E.

Comment A SCL actively participated in the negotiations of the Collaborative Decision-Making (CDM) group, described in additional detail in the additional discussion in Section 8.4.2.1. In that forum, SCL supported acceleration of the 10,000 ton per year limit on sulfur dioxide emissions to the year 2003, which was ultimately agreed to by the CDM participants. That is as early as is reasonable to have two scrubber units installed and operational at the plant, given 1) the time required for design, construction and installation of the scrubbers, and 2) the owners' need to have the regulatory order process implementing the CDM solution completed before proceeding with the capital expenditures for the scrubbers. In order to make the CDM solution acceptable from an economic standpoint, the owners took the position in the CDM negotiations, acknowledged as reasonable by the regulatory agencies, that the plant should be able to continue to operate without additional pollution control measures or restrictions on its output until 2002.

If SCL were to unilaterally shut down its share of the Centralia plant, to the extent it is able to do so under the existing ownership and fuel supply contracts, the utility would incur significant cost for uncertain environmental benefit. Instead, SCL has decided to devote its financial resources toward its continued significant investment in energy conservation programs, its highly successful efforts to mitigate the impacts of its hydroelectric operations, and its imminent investment in the long-term reduction of Centralia sulfur dioxide and nitrogen oxide emissions.

Comment B Please refer to the additional discussion regarding the ongoing study of health effects from Centralia emissions in Section 8.4.2.1.

Comment C Please refer to the DEIS, Section 6.3 Environmental Dispatch as Possible Mitigation, for a discussion of the use of environmental adders in dispatch decisions. As discussed there, SCL's reluctance to pursue a policy of environmental dispatch is based in part on the likelihood that to do so unilaterally would result in relatively little and uncertain environmental benefit.

Comment D Please refer to the DEIS, Section 2.8.2 Electric and Magnetic Fields, for a discussion of EMF and potential health effects. The comment is not specific enough to respond further.

Comment E Model data is relied on to estimate future electricity generation output of the different resource types under each of the alternative resource portfolios and recommendations. The generation estimates are then used to calculate quantifiable environmental parameters such as air emissions. However, the relative ranking of alternative resource portfolios and recommendations is

based only in part on model results. Qualitative comparisons of nonquantified impacts have been considered as well.

Please refer to the DEIS, Sections 5.2 Assumptions for Alternative Resource Portfolios, 6.1.3 Analytical Assumptions, and 8.3 Framework for Analysis of Environmental Impacts of Alternative SRA Recommendations for discussions of the major assumptions used in modeling the alternative resource portfolios and alternative recommendations. Assumptions and calculations of the various quantified impacts are documented in Appendix C. It is not clear what specific additional support or documentation the commenter wishes to be included.

NORTHWEST ENVIRONMENTAL ADVOCATES

Columbia/Willamette
RiverWatch
133 S.W. 2nd Ave. #302
Portland, OR 97204

Washington Office
P.O. Box 733
Clinton, WA 98236
(360) 341-3406

Glenn Atwood
Seattle City Light
Environment and Safety Division
700 Fifth Ave., Suite 3100
Seattle, Wa. 98104-5031

April 30,1996

Dear Glenn,

The following will serve as Northwest Environmental Advocates comments on the Strategic Resources Assessment Draft Environmental Impact Statement. While this document serves mainly as an assessment of need for additional resources, you also state that it will consider energy resource options and policy issues. In that regard we believe that much more attention needs to be paid to the issue of the Centralia Coal Plant. On page 8-16 you state that you have the ability to recommmend changes to SCL's existing resource base. However, you then go on to a brief skimming over of the issues surrounding a decision to stay in or sell the plant. We are particularly disturbed by the reference to "public concern" over environmental impacts of coal-fired generation as though there was no real problem but simply a perception of one. This is disingenuous at best and does not adequately offer a real description of the plant's current situation for anyone in a position to make an informed decision on the future of the plant. You must include a section on the current RACT order and post

Ⓐ

302 Haseltine Bldg., 133 S.W. 2nd Ave., Portland, OR 97204-3526 (503) 295-0490 FAX 295-6634

RACT negotiations as well as the need for a RACT on nitrogen oxides and volatile organic compounds by 1998. In addition, there is a very real possibility that a BART standard will be imposed. At a conference in Seattle two weeks ago involving federal land managers (Forest Service and National Park Service) as well as EPA personnel from Washington D.C., the message delivered to SWAPCA and the Dept. of Ecology was that they left out a BART strategy in their proposed visibility review and that needed to be corrected. To fairly describe the financial implications of staying involved as a minority owner you must lay out the costs associated with all the RACT requirements as well as projected cost for 90% sulphur dioxide removal. If Centralia is projected to run another 20 years, you should also sketch out a possible carbon or btu tax keeping in mind that Centralia is responsible for 10 million tons of greenhouse gases per year. In his testimony before the Energy Facility Site Evaluation Council last year, Jeff King of the Northwest Power Planning Council said that he believes there will be carbon taxes levied on plants currently being proposed for construction, within the next ten years. Certainly they will be levied on the largest emitter, Centralia. Taking the lowest estimate of the NWPPC at $10 per ton you can see that it is not an

You need to fully flesh out several scenarios for consideration: exit strategy, financial implications of RACT for nitrogen oxides, sulphur dioxides and volatile organic compounds, and implications and cost assumptions for a BART determination. There may even be liability for health impacts that this plant causes and it may be prudent to examine that possibility with one of your attorneys. (B)

You discuss environmental dispatch and conclude that it can not be considered because no one else is doing it and it puts you at a competive disadvantage. Seattle City Light is on record, on paper, as valuing environmental impacts of resources. This needs to be translated into action. You could take a lead role in placing this issue in front of the utility agenda and advocating other utilities prioritize it as well. (D)

Sincerely

Nancy Holbrook

Nancy Holbrook

Wa. State Director

To: Glenn Atwood. May 9
From: Nancy Hallbrook - NWEA

Glenn Atwood
Seattle City Light
Environment and Safety Division
700 Fifth Ave. Suite 3100
Seattle, Wa. 98104-5031

Dear Glenn,

I lost my file on my computer on our comments, so I am including this as an addendum. NWEA wants to encourage SCL to use the same externalities which you have chosen to apply to new resource considerations and apply them to power purchases you may consider in the future. It is (E) possible to understand what percentage of "cheap" market power is from fossil fuels and evaluate those sources as you would new resources. It goes without saying that this methodology should be applied to the Centralia Coal Plant. If this plant was to be offered to you today in its present state you would not even consider it because of the environmental concerns, yet you choose not to reconsider or (B) reevaluate this resource with any degree of serious analysis in this SRP. As we mentioned in our previous remarks, you must include a scenario in the final EIS which discusses the options of an exit strategy, a 50%, 70% and 90% Sulphur dioxide removal cost analysis as well as projected costs for the RACT on nitrogen oxides.

With regards to your analysis of renewable resources, we are pleased to see a recommendation on acquisition of 50 MW (F) of wind capacity. A competitive bid RFP process to acquire these megawatts should be considered as a logical next step. We believe this RFP should be open to wind, solar and geothermal technologies. We believe you have taken the worst case scenarios for geothermal. Flash systems are the least likely to be developed in the Northwest, binary systems such as is being developed at Newberry in Oregon, should be considered more probable. Geothermal energy has (G) the potential to deliver reliable, environmentally sound power for the region and deserves a more realistic evaluation as to the true impacts likely in the Northwest. In addition, it has the potential to deliver baseload energy another important factor that should be included in your analysis.

In conclusion, we look forward to working with you to help achieve our mutual goals of a environmentally sound and diverse resource portfolio for the ratepayers of Seattle City Light.

Nancy Hallbrook

Letter 4: Northwest Environmental Advocates

Note: Nancy Holbrook faxed the original letter to Seattle City Light on May 3, but page 3 was not transmitted. When notified of this, Ms. Holbrook was unable to provide page 3 but did fax a second letter, referred to here as an Addendum, on May 10. The two letters are addressed together.

Comment A Additional information has been added to Section 8.4.2.1, Centralia, regarding the regulatory status of Centralia and the potential adverse environmental impacts of its ongoing operation.

Comment B The proposed target solution for reductions of Centralia sulfur dioxide emissions, resulting from collaborative decisionmaking negotiations between plant owners, air quality regulatory agencies and federal land management agencies, calls for an annual limit of 10,000 tons per year by 2003. This level of emission reductions exceeds any expected result from a RACT review and is judged by the regulatory agencies to be at least as protective in terms of timing and level of emissions as would be achieved through a Best Available Retrofit Technology (BART) process. The present value of Seattle City Light's share of the target solution's sulfur dioxide reductions is $18.3 million net present value (NPV).

Regarding RACT for nitrogen oxides, plans for Centralia air quality compliance has for some time assumed the installation of low-NOx burners, which is expected to comply with anticipated RACT requirements. SCL's share of the costs for nitrogen oxide emission reductions is $1.05 million NPV.

It is not expected that additional controls will be required as a result of RACT review for volatile organic compound (VOC) emissions, should it be performed.

Comment C A carbon tax would affect the costs of generating electricity at the Centralia plant and, depending on the magnitude of the tax, could make the plant uneconomic to operate under most circumstances. However, a carbon tax would be expected to affect the operation of Centralia in a similar manner across all of the alternative portfolios and alternative recommendations evaluated in the EIS.

Comment D Please refer to the response to Gregory Bowers comment C.

Comment E Please see the discussion on page 7 of the Final SRA for a discussion of the treatment of the externalities of energy market purchases in SCL's energy resource analysis.

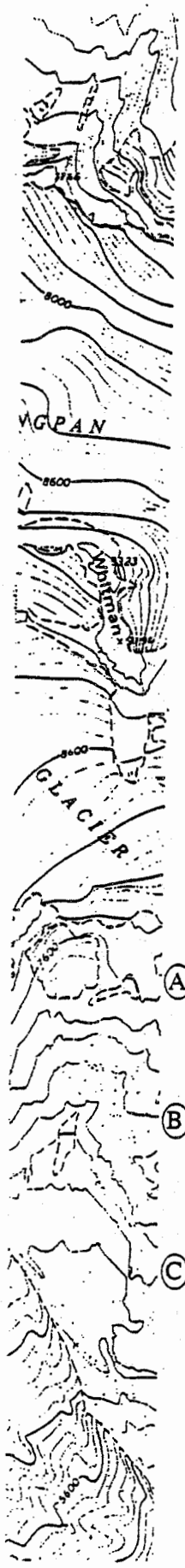
Comment F Comment acknowledged.

Comment G The 1991 Northwest Power Plan listed over five times the megawatt (MW) potential for high temperature geothermal resources compared to the potential for medium temperature sites. Given that flash technology (or a hybrid technology involving flash methods) is generally more economical to apply to high temperature resources than binary, we have elected dual flash as the most likely candidate technology to be available or offered to SCL for potential acquisition.

Additionally, it is our understanding that flash technology rather than binary technology was to be used at the Newberry Crater project (see Newberry Geothermal Pilot Project Final Environmental Impact Statement, United States Forest Service, p. 2-4). The project has been canceled because insufficient geothermal energy was found during exploratory drilling.

Finally, the base-loaded nature of geothermal is accounted for in the analysis performed in the Strategic Resources Assessment. In general, a resource which produces primarily base-load energy is not as valuable to SCL's hydro-dominated system as a dispatchable resource which can be operated to supplement available hydroelectricity and to produce electricity at times when it is more valuable.

LETTER 5



THE MOUNTAINEERS

Founded in 1906 to Explore, Study, Preserve, and Enjoy the Natural Beauty of the Outdoors

May 9, 1996

Gary Zarker, Superintendent
Attn: Glenn Atwood, Project Manager
Seattle City Light
700 Fifth Avenue, Suite 3100
Seattle, WA 98104-5031

RE: Comments on Draft Strategic Resources Assessment and Draft EIS

Dear Mr. Zarker:

The Mountaineers is pleased to offer the following comments regarding Seattle City Light's Draft Strategic Resources Assessment (SRA) and accompanying draft environmental impact statement (DEIS). We furthermore commend Seattle City Light on its decision to extend the public comment deadline on these documents until May 10th. The Mountaineers would not otherwise have been able to provide comment on an issue of much importance to our members.

The Mountaineers is the oldest and largest conservation and outdoor recreation organization in the state of Washington, with over 15,000 members. Many of our members rely on the natural resources in and around Mount Rainier National Park for hiking, backpacking, nature enjoyment, climbing, snowshoeing, and back-country skiing -- to name but a handful of activities. As residents of the Pacific Northwest, we are also concerned about air pollution in the region and its effects on human health. It is in this context that we wish to comment on the portions of SRA and accompanying DEIS that pertain to the coal-fired Centralia Power Plant.

A We strongly encourage Seattle City Light to carefully reconsider its use of the Centralia generating facility for Seattle's energy needs. Specifically, the utility should fully consider the major adverse effects of Centralia Plant operations on our health, environment, and quality of life; and factor in the costs to ameliorate these problems when evaluating this energy source.

B The Centralia Power Plant is the largest emitter of SO_2, or sulfur dioxide, in the western United States, and the source of 50 percent of the sulfur dioxide in Western Washington. An estimated 84,000 tons of SO_2 will be released by the Centralia Plant this year 1996. That number is expected to grow to approximately 94,000 tons per year by the turn of the century.

C The Mountaineers would like to address (and encourage City Light to address) the broader implications of human health as they relate to the utility's use of this energy source. We appreciate the fact that Seattle City Light, concerned with possible adverse health and environmental effects of the Project, did not object to a proposition which would have allowed more time for public involvement before the Centralia RACT Order was issued. Given the strength of the available evidence showing the harmful effects of

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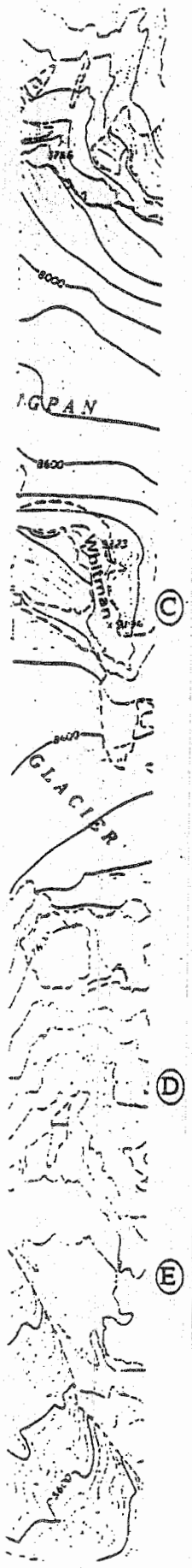
cc: Skinnarland



particulate pollution, and the EPA's endorsement of the health value of particulate reduction, we feel the Centralia Plant very likely does impact human health.

As currently configured, operation of the Centralia Power Plant results in production of large amounts of particulate air pollution. This form of pollution is often associated with significant morbidity and mortality rates as reported in studies by qualified epidemiologists, including C. Arden Pope, Douglas W. Dockery, and Joel Schwartz. The most recent epidemiological studies have been corrected for various risk factors, and continue to find that particulate air pollution has a significant impact on not only the health, but also the life expectancy of human beings. Adverse effects occur well below particulate concentration limits currently allowed by EPA. Further, the EPA is now among those organizations that have substantiated these adverse effects with its own study. (EPA, *Human Health Benefits From Sulfate Reductions Under Title IV Of The 1990 Clean Air Act Amendments*, November 1995. The EPA is currently reviewing its current particulate health standards in preparation for revision.)

A June 1995 American Lung Association document, *Dollars and Cents*, provides an estimate of annual health benefits if selected counties throughout the nation would meet the more stringent California particulate matter standards. In one year, 19 lives and over $90,000 in health benefits could be saved in King County, just by reducing particulate pollution. Similar conclusions have been reached in Canada. (BC Environment, *Health Effects of Inhalable Particles: Implications for British Columbia*, June 1995.)

Several modeling studies (independent reviews) have already been done on the potential health effects of a generic western Washington coal fired power plant such as Centralia. Eco Northwest provided a "generic coal study", dated 31 January 1987. Pacific Northwest Laboratory of Richland WA provided an *Air Quality Analysis And Related Risk Assessment* dated April 1992. Both studies reported significant mortality and morbidity due to plant operation and concluded a large dollar valuation for health impacts.

We note that City Light has been arranging for an independent review of the health effects of the Centralia plant since at least November 1995. We feel the time and expense taken for yet another study would be of questionable value. If another review must be performed, please notify us as soon as possible of when this review will be complete.

The Mountaineers likewise remains very concerned over the effect of Plant emissions on the health of the ecosystem in and around Mount Rainier National Park. The National Park Service estimates that the Centralia Plant contributes 20 percent of sulfur gas that forms light-blocking sulfate particulate over the Park. (National Park Service, *Pacific Northwest Regional Visibility Experiment Using Natural Tracers*, February 1994). The particulate contributes to lake acidification and other acid rain-related problems in the Park. Such impacts are clearly in conflict with sections of the 1990 Clean Air Act Amendment (ACT) governing Class One Areas of the Park and

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adjacent wilderness. They also indicate a clear violation of the National Park Service Organic Act which mandates that the resources within the Park be managed in an "unimpaired" condition.

Plant emissions also affect recreation opportunities and aesthetic enjoyment across the region and around Mount Rainier National Park. In addition to causing a substantial decline in the number of days per year that City Light customers and others can view Mount Rainier from the Seattle area, light-blocking particulates cause significant and adverse impacts on aesthetics (and thus recreation experiences) within the Park.

In light of the above, we remain concerned over the utility's statement of the Draft EIS that "the plant is in compliance with existing environmental regulations and currently provides reliable power at moderate costs." (DEIS at 8-18) This is simply not the case when one factors in all the human health, environmental, recreational, and aesthetic implications of the utility's reliance on power generated at the Centralia facility.

Thank you again for this opportunity to comment on this issue and please feel free to contact Mountaineers with questions regarding the contents of this letter.

Sincerely,

THE MOUNTAINEERS

Marcia Hanson

Marcia Hanson
President

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Letter 5: The Mountaineers

Comment A Please refer to the additional discussion regarding Centralia in Section 8.4.2.1.

Comment B Please refer to the response to Comment A from Phil Pearl, National Parks and Conservation Association.

Comment C Please refer to the additional discussion regarding Centralia in Section 8.4.2.1.

Comment D As stated in the additional discussion in Section 8.4.2.1, PacifiCorp is currently managing a study of the health impacts of air emissions from Centralia. The study is expected to be completed and made available to the public in July, 1997.

Comment E Please refer to the additional discussion in Section 8.4.2.1.

Comment F Please refer to the additional discussion in Section 8.4.2.1.

Renewable Northwest Project

A project of the Northwest Conservation Act Coalition

J. Rachel Shimshak
Project Director

1130 SW Morrison
Suite 330
Portland, OR 97205

Phone
503.223.4544
Fax
503.223.4554

Renewable Northwest Project

May 8, 1996

Gary Zarker, Superintendent
Seattle City Light
700 Fifth Avenue, Suite 3100
Seattle, WA 98104-5031

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SUPERINTENDENT'S OFFICE

Dear Mr. Zarker,

The Renewable Northwest Project (RNP) appreciates this opportunity to comment on Seattle City Light's Draft Strategic Resource Assessment (SRA) and the accompanying Draft Environmental Impact Statement (EIS). We thank you for extending the comment period and giving us more time to review your efforts.

RNP has actively participated in the development of the SRA and its EIS, meeting with staff and commenting on the Draft Strategic Resources Plan and the New Technologies Assessment. We also made a presentation on renewables and the emerging new market to the 1995 SRP Citizen Advisory Technical Review Committee.

(A) The Draft SRA presents a balanced and reasoned approach to resource acquisition in this era of a new, emerging open market. We applaud Seattle City Light (SCL) for its continuing leadership particularly in environmental accountability, least cost planning and valuing a portfolio of resources.

(B) RNP strongly supports the SRA's recommendation to consider acquiring 50 MW of wind capacity to promote new technology, minimize environmental impacts, add diversity to the utility's resource base, and meet customer desires for a cleaner energy supply mix. As the SRA and its EIS demonstrate, there are minimal costs to this action and enormous social, environmental and strategic gains.

(C) The critical next step for SCL will be to set up a process for acquiring the 50 MW of renewable energy. RNP urges SCL to open this acquisition to a competitive bid through a green RFP for renewable technologies in the region (wind, geothermal and solar). This will allow SCL to take advantage of the competitive renewables market, provide the broadest possible set of choices, and get the current data on resource costs for subsequent assessments and planning.

(D) RNP also strongly supports the SRA's recommendations to include environmental externalities in actual acquisition decisions, and to account for the environmental impacts of purchased surplus capacity. SCL is one of the only analyses to take into account the resource content of the surplus and its enormous pollution impacts.

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(E) RNP was pleased to see the SRA recommending that SCL advocate for mechanisms to ensure that conservation and renewables are part of the energy mix in a deregulated electricity industry. RNP hopes that SCL will continue to be a strong advocate for public policies that overcome market barriers, treat all competitors equally, value the environment and strive for long-term lowest cost.

(F) In a review of public opinion surveys, SCL concluded that local ratepayers would pay extra for an environmentally cleaner resource mix. Your conclusions are supported by RNP's own review of national and regional surveys done over the last two years. RNP found support for the environment and the acquisition of renewables and conservation to be strong, consistent and diverse across the region. A copy of our review is attached.

(G) One area of analysis that could be improved is your treatment of the Centralia coal plant. Centralia is one of the dirtiest plant in the West and has been effectively grandfathered out of meeting current Clean Air Act requirements. Emissions from Centralia are harming Mt. Rainier National Park and causing the acidification of lakes in the Cascades. SCL, at a minimum, should be actively working to ensure full emissions scrubbing and bringing environmental controls at Centralia up to new plant standards. A program to close the plant and replace its output with conservation, renewables and cleaner sources would help curtail a growing environmental problem.

Overall, SCL has produced a solid, forward-thinking set of analyses and recommendations. SCL has done a great job of taking a leadership position in the region and listening to the concerns and desires of its customers. It has been our pleasure to work with staff in developing this Draft SRA and we offer whatever help and assistance we can in turning your recommendations into concrete action plans.

Sincerely,

J. Rachel Shimshak

J. Rachel Shimshak
Project Director

Peter West

Peter West
Senior Policy Associate

Attachment

Letter 6: Renewable Northwest Project

Note: A copy of "A Summary of National and Regional Surveys Affirming Consistent Public Support for Conservation and Renewable Energy," compiled by the Renewable Northwest Project and dated March 14, 1996, was attached to this comment letter and is available for review at Seattle City Light, Environment & Safety Division.

Comment A Comment acknowledged. Thank you for the compliment.

Comment B Comment acknowledged.

Comment C Comment acknowledged.

Comment D Comment acknowledged.

Comment E Comment acknowledged.

Comment F Comment noted.

Comment G Please refer to the additional discussion regarding Centralia in Section 8.4.2.1.

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APPENDIX A

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City of Seattle, Public Utilities
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King County Planning Division
King County Assessment
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Puget Sound Air Pollution Control Agency
Olympic Air Pollution Control Authority

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Thurston Regional Planning Council

TRIBES:
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Puyallup Indian Tribe
Muckleshoot Indian Tribe
Suquamish Tribal Community
United Indians of All Tribes

OTHER INTERESTED PARTIES:
Phil Pearl, National Parks and Conservation Association
Nancy Holbrook, Northwest Environmental Advociates
Marcia Hanson, The Mountaineers
J. Rachel Shimshak and Peter West, Renewables Northwest Project
Northwest Conservation Act Coalition

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Pierce County Utilities
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Washington Public Power Supply System
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South Park Area Redevelopment Council
Greater Duwamish District Council
Frederickson & Clover Creek Community Council
Elliott Bay/Duwamish Restoration Panel
Simpson Timber Company
Eco & Environment, Inc.
Port of Tacoma
Dames & Moore
Thurston County Economic Development Council
White Center Chamber of Commerce
White Center Citizens Advisory Committee
Highland Park Community Council
Clover Creek Community Council
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Washington Environmental Council
Washington Public Interest Research Group
Friends of the Duwamish
Olympic Pipeline Company
Caruso & Fredricks
Evergreen Legal Service
NC Machinery
Neighborhood Business Council
Delta Marine Industry, Inc.
The Boeing Company
Harmony Gardens Care Center

Rhone-Poulenc Inc.
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APPENDIX B

RESOURCE CAPACITY AND GENERATION REFERENCE TABLES FOR ALTERNATIVE ~~RESOURCE PORTFOLIOS AND~~ SRA RECOMMENDATIONS

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Table B-2. Generation by Resource Type for Alternative SRA Recommendations, Year 1998

Resource Type	Alternative SRA Recommendations, Year 1998 (aMW)						
	Alt. A	Alt. B	Alt. C	Alt. D	Preferred	Var. 1	Var.2
BPA Purchase[1/]	171.1	171.5	87.6	88.0	152.5	152.5	152.5
Not Purchased	*(48.9)*	*(48.5)*	*(132.4)*	*(132.0)*	*(67.5)*	*(67.5)*	*(67.5)*
Centralia	75.3	75.3	75.9	75.9	75.5	75.5	75.5
Conservation	26.0[2/]	20.0[3/]	26.0[2/]	20.0[3/]	20.0[3/]	20.0[3/]	20.0[3/]
Market Purchases[1/]	146.1	148.1	183.4	185.7	156.2	136.2	136.2
Combustion Turbine[4/]	—	—	—	—	—	20.0 (CCCT)	20.0 (SCCT)
Total Energy	418.5	414.9	372.9	369.6	404.2	404.2	404.2
Surplus Sales[1/]	248.3	245.1	203.9	201.0	234.6	234.6	234.6

1/ Market purchases, displacement resulting from surplus sales, and changes in BPA purchases from SCL's 1994 entitlement of approximately 220 aMW are assumed equivalent to a melded marginal resource based on 10% existing simple-cycle combustion turbine, 5% existing combined-cycle combustion turbine, 45% existing gas-fired steam boiler generation, 35% existing coal-fired generation, and 5% avoided hydro spill. Increases in BPA purchases result in increased emissions and quantified impacts and reductions in BPA purchases result in corresponding reductions in impacts.

2/ Assumes conservation at levels in 1992 Conservation Implementation Plan (approximately 9 aMW per year).

3/ Assumes conservation at levels in 1996 Energy Management Services Plan (approximately 6 aMW per year).

4/ Variation 1 of preferred alternative includes 20 aMW of energy from a combined-cycle combustion turbine; variation 2 includes 20 aMW of energy from a simple-cycle combustion turbine.

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APPENDIX C

CALCULATIONS FOR QUANTIFIED ENVIRONMENTAL EFFECTS FOR ALTERNATIVE ~~RESOURCE PORTFOLIOS AND SRA~~ RECOMMENDATIONS

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APPENDIX C

CALCULATIONS FOR QUANTIFIED ENVIRONMENTAL IMPACTS FOR ALTERNATIVE ~~RESOURCE PORTFOLIOS AND~~ SRA RECOMMENDATIONS

The tables on the following pages summarize the calculation of quantified impacts for the ~~alternative resource portfolios in the years 2000 and 2010 and for the alternative~~ SRA recommendations in the year 1998. The calculations of quantified impacts for the alternative resource portfolios for the years 2000 and 2010 remain as presented in the DEIS. There are three sections, each consisting of a particular set of impacts as follows:

Section	Impacts
C-1	Air Emissions
C-2	Non-Air & Fuel (Water, Employment, Soil/Land Use)
C-3	Fuel Use

~~Each section is organized by the three years for which impacts are estimated, in the following order: 2000, 2010, and 1998.~~ The pages are numbered by section using the pattern C-x-y, where x is the section and y is the page number for that section.

For each ~~year in a particular~~ section, the first page summarizes the impact factors by resource type, in either units/MWh of energy (for operational impacts) and units/MW of capacity (for construction impacts). The next one or two pages summarize the energy and capacity provided by each resource type for the alternative ~~portfolio or~~ SRA recommendations~~, as appropriate~~: Sections C-1 and C-3 include only the energy summary. Because all air emissions and fuel impacts are operational rather than construction-related, resource capacities are not relevant for calculating these impacts. The remaining pages summarize the individual quantified impacts, both by resource and in total.

The quantified impacts are calculated by multiplying the impact factors for each resource by the amount of energy or capacity provided by that resource. The quantified impacts are then summed for all resource types in a particular year to determine the total.

Reductions in quantified impacts are assumed to occur in two cases: first, when SCL sells surplus power and thereby displaces or reduces generation from others' resources, and second, when we reduce the amount of power purchased from the Bonneville Power Administration (BPA) below the approximate level of our 1994 entitlement of 220 aMW.

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YEAR 1998	Air Emission Factors					
	CO2	NOx	SO2	TSP	VOC	CO
Resource Type	lb/MWh	lb/MWh	lb/MWh	lb/MWh	lb/MWh	lb/MWh
Centralia (existing pulverized coal)	2303.400	4.712	17.800	0.418	0.041	0.370
Conservation	0.000	0.000	0.000	0.000	0.000	0.000
Wind	0.000	0.000	0.000	0.000	0.000	0.000
Geothermal	160.640	0.000	0.000	0.000	0.000	0.000
Cogeneration	807.300	0.210	0.007	0.035	0.063	0.150
CC Combustion Turbines	883.220	0.233	0.082	0.037	0.067	0.170
SC Combustion Turbines	1316.600	0.997	0.123	0.056	0.100	0.370
Fuel Cells	690.000	0.009	0.000	0.000	0.000	0.000
Firm Purchases (SW SCCT)	1316.600	0.997	0.123	0.056	0.100	0.370
Market Purchases	1465.919	3.061	2.945	0.145	0.035	0.430
Total Generation/Purchase						
Surplus Sales	1465.919	3.061	2.945	0.145	0.035	0.430
BPA Purchase Reduction	1465.919	3.061	2.945	0.145	0.035	0.430
Net Total						

SCL SRA FEIS
Quantified Impacts, Air Emissions

YEAR 1998		RESOURCE ASSUMPTIONS aMW (Generation)			Operation Impacts		
	Alternative SRA Recommendations						
Resource Type	Alt. A	Alt. B	Alt. C	Alt. D	Preferred	Var. 1	Var. 2
Centralia (existing pulverized coal)	75.3	75.3	75.9	75.9	75.5	75.5	75.5
Conservation	26.0	20.0	26.0	20.0	20.0	20.0	20.0
Wind	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Geothermal	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cogeneration	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CC Combustion Turbines	0.0	0.0	0.0	0.0	0.0	20.0	0.0
SC Combustion Turbines	0.0	0.0	0.0	0.0	0.0	0.0	20.0
Fuel Cells	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Firm Purchases (SW SCCT)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Market Purchases	146.1	148.1	183.4	185.7	156.2	136.2	136.2
Total Generation/Purchase	**247.4**	**243.4**	**285.3**	**281.6**	**251.7**	**251.7**	**251.7**
Surplus Sales	248.3	245.1	203.9	201.0	234.6	234.6	234.6
BPA Purchase Reduction	48.9	48.5	132.4	132.0	67.5	67.5	67.5
Net Total	-49.8	-50.2	-51.0	-51.4	-50.4	-50.4	-50.4

YEAR 1998		Air Emissions		CO2 (tons)			
	Alternative SRA Recommendations						
Resource Type	Alt. A	Alt. B	Alt. C	Alt. D	Preferred	Var. 1	Var. 2
Centralia (existing pulverized coal)	759694	759,694	765,747	765,747	761,711	761,711	761,711
Conservation	0	0	0	0	0	0	0
Wind	0	0	0	0	0	0	0
Geothermal	0	0	0	0	0	0	0
Cogeneration	0	0	0	0	0	0	0
CC Combustion Turbines	0	0	0	0	0	77,370	0
SC Combustion Turbines	0	0	0	0	0	0	115,334
Fuel Cells	0	0	0	0	0	0	0
Firm Purchases (SW SCCT)	0	0	0	0	0	0	0
Market Purchases	938068	950,909	1,177,561	1,192,329	1,002,917	874,503	874,503
Total Generation/Purchase	**1,697,762**	**1,710,603**	**1,943,308**	**1,958,076**	**1,764,629**	**1,713,584**	**1,751,548**
Surplus Sales	1,594,266	1,573,720	1,309,186	1,290,566	1,506,302	1,506,302	1,506,302
BPA Purchase Reduction	313,973	311,405	850,104	847,536	433,399	433,399	433,399
Net Total	-210,478	-174,522	-215,982	-180,026	-175,072	-226,117	-188,153

SCL SRA FEIS
Quantified Impacts, Air Emissions

YEAR 1998		Air Emissions		NOx (tons)			
	Alternative SRA Recommendations						
Resource Type	Alt. A	Alt. B	Alt. C	Alt. D	Preferred	Var. 1	Var. 2
Centralia (existing pulverized coal)	1554.1	1554.1	1566.5	1566.5	1558.2	1558.2	1558.2
Conservation	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wind	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Geothermal	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cogeneration	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CC Combustion Turbines	0.0	0.0	0.0	0.0	0.0	20.4	0.0
SC Combustion Turbines	0.0	0.0	0.0	0.0	0.0	0.0	87.3
Fuel Cells	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Firm Purchases (SW SCCT)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Market Purchases	1958.8	1985.6	2458.9	2489.7	2094.2	1826.1	1826.1
Total Generation/Purchase	**3,512.9**	**3,539.7**	**4,025.3**	**4,056.2**	**3,652.4**	**3,404.7**	**3,471.6**
Surplus Sales	3329.0	3286.1	2733.7	2694.8	3145.3	3145.3	3145.3
BPA Purchase Reduction	655.6	650.2	1775.1	1769.7	905.0	905.0	905.0
Net Total	-471.7	-396.7	-483.5	-408.4	-397.9	-645.6	-578.7

YEAR 1998		Air Emissions		SO2 (tons)			
	Alternative SRA Recommendations						
Resource Type	Alt. A	Alt. B	Alt. C	Alt. D	Preferred	Var. 1	Var. 2
Centralia (existing pulverized coal)	5870.7	5870.7	5917.5	5917.5	5886.3	5886.3	5886.3
Conservation	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wind	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Geothermal	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cogeneration	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CC Combustion Turbines	0.0	0.0	0.0	0.0	0.0	7.2	0.0
SC Combustion Turbines	0.0	0.0	0.0	0.0	0.0	0.0	10.8
Fuel Cells	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Firm Purchases (SW SCCT)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Market Purchases	1884.6	1910.4	2365.7	2395.4	2014.8	1756.9	1756.9
Total Generation/Purchase	**7,755.2**	**7,781.0**	**8,283.2**	**8,312.8**	**7,901.1**	**7,650.3**	**7,653.9**
Surplus Sales	3202.8	3161.6	2630.1	2592.7	3026.1	3026.1	3026.1
BPA Purchase Reduction	630.8	625.6	1707.8	1702.7	870.7	870.7	870.7
Net Total	**3921.6**	**3993.9**	**3945.2**	**4017.4**	**4004.3**	**3753.5**	**3757.1**

YEAR 1998		Air Emissions		TSP (tons)			
	Alternative SRA Recommendations						
Resource Type	Alt. A	Alt. B	Alt. C	Alt. D	Preferred	Var. 1	Var. 2
Centralia (existing pulverized coal)	137.9	137.9	139.0	139.0	138.2	138.2	138.2
Conservation	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wind	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Geothermal	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cogeneration	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CC Combustion Turbines	0.0	0.0	0.0	0.0	0.0	3.2	0.0
SC Combustion Turbines	0.0	0.0	0.0	0.0	0.0	0.0	4.9
Fuel Cells	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Firm Purchases (SW SCCT)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Market Purchases	92.8	94.1	116.5	117.9	99.2	86.5	86.5
Total Generation/Purchase	**230.7**	**231.9**	**255.4**	**256.9**	**237.4**	**228.0**	**229.6**
Surplus Sales	157.7	155.7	129.5	127.7	149.0	149.0	149.0
BPA Purchase Reduction	31.1	30.8	84.1	83.8	42.9	42.9	42.9
Net Total	**41.9**	**45.5**	**41.9**	**45.4**	**45.6**	**36.1**	**37.8**

YEAR 1998		Air Emissions		VOC (tons)			
	Alternative SRA Recommendations						
Resource Type	Alt. A	Alt. B	Alt. C	Alt. D	Preferred	Var. 1	Var. 2
Centralia (existing pulverized coal)	13.5	13.5	13.6	13.6	13.6	13.6	13.6
Conservation	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wind	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Geothermal	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cogeneration	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CC Combustion Turbines	0.0	0.0	0.0	0.0	0.0	5.9	0.0
SC Combustion Turbines	0.0	0.0	0.0	0.0	0.0	0.0	8.8
Fuel Cells	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Firm Purchases (SW SCCT)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Market Purchases	22.4	22.7	28.1	28.5	23.9	20.9	20.9
Total Generation/Purchase	**35.9**	**36.2**	**41.7**	**42.1**	**37.5**	**40.3**	**43.2**
Surplus Sales	38.1	37.6	31.3	30.8	36.0	36.0	36.0
BPA Purchase Reduction	7.5	7.4	20.3	20.2	10.3	10.3	10.3
Net Total	**-9.6**	**-8.8**	**-9.8**	**-9.0**	**-8.8**	**-6.0**	**-3.1**

YEAR 1998		Air Emissions		CO (tons)				
	Alternative SRA Recommendations							
Resource Type	Alt. A	Alt. B	Alt. C	Alt. D	Preferred	Var. 1	Var. 2	
Centralia (existing pulverized coal)	122.0	122.0	123.0	123.0	122.4	122.4	122.4	
Conservation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Wind	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Geothermal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Cogeneration	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
CC Combustion Turbines	0.0	0.0	0.0	0.0	0.0	14.9	0.0	
SC Combustion Turbines	0.0	0.0	0.0	0.0	0.0	0.0	32.4	
Fuel Cells	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Firm Purchases (SW SCCT)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Market Purchases	275.2	278.9	345.4	349.7	294.2	256.5	256.5	
Total Generation/Purchase	**397.2**	**401.0**	**468.4**	**472.8**	**416.5**	**393.8**	**411.3**	
Surplus Sales	467.6	461.6	384.0	378.6	441.8	441.8	441.8	
BPA Purchase Reduction	92.1	91.3	249.4	248.6	127.1	127.1	127.1	
Net Total	-162.6	-152.0	-165.0	-154.4	-152.4	-175.2	-157.7	

SCL SRA FEIS
Quantified Impacts, Non-Air&Fuel

YEAR 1998	Quantified Impact Factors						
	Water	Waste	Thermal	Employment	Employment	Soil/Land	Soil/Land
	Consumed	Water	Discharge	Construction	Operations	mining/extrac	construction
Resource Type	ac-ft/aMW	ac-ft/aMW	MMBtu/aMW	employ-yr/MW	employ/MW	acres/aMW	acres/MW
Centralia (existing pulverized coal)	10.69	1.870	42200	0.00	0.000	0.250	0.00
Conservation	0.00	0.000	0	30.00	0.000	0.000	0.00
Wind	0.00	0.000	0	1.90	0.400	0.000	5.90
Geothermal	0.00	0.000	0	4.10	0.300	0.000	0.27
Cogeneration	3.40	1.670	28800	1.88	0.116	0.025	0.15
CC Combustion Turbines	3.40	1.670	28800	1.88	0.116	0.025	0.15
SC Combustion Turbines	0.148	0.148	0	1.88	0.116	0.025	0.15
Fuel Cells	0.97	0.000	0	0.00	0.000	0.020	0.05
Firm Purchases (SW SCCT)	0.148	0.148	0	1.88	0.116	0.025	0.15
Market Purchases	5.46	1.50	29170	0.000	0.000	0.1025	0.000
Total Generation/Purchase							
Surplus Sales	5.46	1.50	29170	0.000	0.000	0.1025	0.000
BPA Purchase Reduction	5.46	1.50	29170	0.000	0.000	0.1025	0.000
Net Total							

SCL SRA FEIS
Quantified Impacts, Non-Air&Fuel

		RESOURCE ASSUMPTIONS					
YEAR 1998		**MW Capacity**		**Construction Impacts**			
	Alternative SRA Recommendations						
Resource Type	Alt. A	Alt. B	Alt. C	Alt. D	Preferred	Var. 1	Var. 2
Centralia (existing pulverized coal)							
Conservation	26	20	26	20	20	20	20
Wind							
Geothermal							
Cogeneration							
CC Combustion Turbines							
SC Combustion Turbines							
Fuel Cells							
Firm Purchases (SW SCCT)							
Market Purchases							
Total Generation/Purchase							
Surplus Sales							
BPA Purchase Reduction							
Net Total							

SCL SRA FEIS
Quantified Impacts, Non-Air&Fuel

		RESOURCE ASSUMPTIONS					
YEAR 1998		**aMW Generation**			**Operation Impacts**		
	Alternative SRA Recommendations						
Resource Type	Alt. A	Alt. B	Alt. C	Alt. D	Preferred	Var. 1	Var. 2
Centralia (existing pulverized coal)	75.3	75.3	75.9	75.9	75.5	75.5	75.5
Conservation	26.0	20.0	26.0	20.0	20.0	20.0	20.0
Wind							
Geothermal							
Cogeneration							
CC Combustion Turbines						20.0	
SC Combustion Turbines							20.0
Fuel Cells							
Firm Purchases (SW SCCT)							
Market Purchases	146.1	148.1	183.4	185.7	156.2	136.2	136.2
Total Generation/Purchase	**247.4**	**243.4**	**285.3**	**281.6**	**251.7**	**251.7**	**251.7**
Surplus Sales	248.3	245.1	203.9	201.0	234.6	234.6	234.6
BPA Purchase Reduction	48.9	48.5	132.4	132.0	67.5	67.5	67.5
Net Total	**-49.8**	**-50.2**	**-51.0**	**-51.4**	**-50.4**	**-50.4**	**-50.4**

SCL SRA FEIS
Quantified Impacts, Non-Air&Fuel

YEAR 1998		Operational Impact			Water Consumed (ac-ft)		
	Alternative SRA Recommendations						
Resource Type	Alt. A	Alt. B	Alt. C	Alt. D	Preferred	Var. 1	Var. 2
Centralia (existing pulverized coal)	805.0	805.0	811.4	811.4	807.1	807.1	807.1
Conservation	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wind	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Geothermal	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cogeneration	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CC Combustion Turbines	0.0	0.0	0.0	0.0	0.0	68.0	0.0
SC Combustion Turbines	0.0	0.0	0.0	0.0	0.0	0.0	3.0
Fuel Cells	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Firm Purchases (SW SCCT)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Market Purchases	797.7	808.6	1001.4	1013.9	852.9	743.7	743.7
Total Generation/Purchase	**1,602.7**	**1,613.6**	**1,812.7**	**1,825.3**	**1,659.9**	**1,618.7**	**1,553.7**
Surplus Sales	1355.7	1338.2	1113.3	1097.5	1280.9	1280.9	1280.9
BPA Purchase Reduction	267.0	264.8	722.9	720.7	368.6	368.6	368.6
Net Total	**-20.0**	**10.5**	**-23.5**	**7.1**	**10.5**	**-30.7**	**-95.8**

SCL SRA FEIS
Quantified Impacts, Non-Air&Fuel

YEAR 1998		Operational Impact			Waste Water (ac-ft)		
	Alternative SRA Recommendations						
Resource Type	Alt. A	Alt. B	Alt. C	Alt. D	Preferred	Var. 1	Var. 2
Centralia (existing pulverized coal)	140.8	140.8	141.9	141.9	141.2	141.2	141.2
Conservation	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wind	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Geothermal	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cogeneration	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CC Combustion Turbines	0.0	0.0	0.0	0.0	0.0	33.4	0.0
SC Combustion Turbines	0.0	0.0	0.0	0.0	0.0	0.0	3.0
Fuel Cells	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Firm Purchases (SW SCCT)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Market Purchases	219.2	222.2	275.1	278.6	234.3	204.3	204.3
Total Generation/Purchase	**360.0**	**363.0**	**417.0**	**420.5**	**375.5**	**378.9**	**348.4**
Surplus Sales	372.5	367.7	305.9	301.5	351.9	351.9	351.9
BPA Purchase Reduction	73.4	72.8	198.6	198.0	101.3	101.3	101.3
Net Total	**-85.8**	**-77.4**	**-87.4**	**-79.0**	**-77.7**	**-74.3**	**-104.7**

SCL SRA FEIS
Quantified Impacts, Non-Air&Fuel

YEAR 1998		Operational Impact			Thermal Discharge (MMBtu)		
	Alternative SRA Recommendations						
Resource Type	Alt. A	Alt. B	Alt. C	Alt. D	Preferred	Var. 1	Var. 2
Centralia (existing pulverized coal)	3,177,660	3,177,660	3,202,980	3,202,980	3,186,100	3,186,100	3,186,100
Conservation	0	0	0	0	0	0	0
Wind	0	0	0	0	0	0	0
Geothermal	0	0	0	0	0	0	0
Cogeneration	0	0	0	0	0	0	0
CC Combustion Turbines	0	0	0	0	0	576,000	0
SC Combustion Turbines	0	0	0	0	0	0	0
Fuel Cells	0	0	0	0	0	0	0
Firm Purchases (SW SCCT)	0	0	0	0	0	0	0
Market Purchases	4,261,737	4,320,077	5,349,778	5,416,869	4,556,354	3,972,954	3,972,954
Total Generation/Purchase	**7,439,397**	**7,497,737**	**8,552,758**	**8,619,849**	**7,742,454**	**7,735,054**	**7,159,054**
Surplus Sales	7,242,911	7,149,567	5,947,763	5,863,170	6,843,282	6,843,282	6,843,282
BPA Purchase Reduction	1,426,413	1,414,745	3,862,108	3,850,440	1,968,975	1,968,975	1,968,975
Net Total	**-1,229,927**	**-1,066,575**	**-1,257,113**	**-1,093,761**	**-1,069,803**	**-1,077,203**	**-1,653,203**

SCL SRA FEIS
Quantified Impacts, Non-Air&Fuel

YEAR 1998		Construction Impacts			Employment (employee-yrs)		
	Alternative SRA Recommendations						
Resource Type	Alt. A	Alt. B	Alt. C	Alt. D	Preferred	Var. 1	Var. 2
Centralia (existing pulverized coal)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Conservation	780.0	600.0	780.0	600.0	600.0	600.0	600.0
Wind	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Geothermal	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cogeneration	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CC Combustion Turbines	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SC Combustion Turbines	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Cells	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Firm Purchases (SW SCCT)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Market Purchases	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Generation/Purchase	**780.0**	**600.0**	**780.0**	**600.0**	**600.0**	**600.0**	**600.0**
Surplus Sales	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BPA Purchase Reduction	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Net Total	**780.0**	**600.0**	**780.0**	**600.0**	**600.0**	**600.0**	**600.0**

SCL SRA FEIS
Quantified Impacts, Non-Air&Fuel

YEAR 1998		Operational Impacts			New Employment (employees)		
	Alternative SRA Recommendations						
Resource Type	Alt. A	Alt. B	Alt. C	Alt. D	Preferred	Var. 1	Var. 2
Centralia (existing pulverized coal)	0	0	0	0	0	0	0
Conservation	0	0	0	0	0	0	0
Wind	0	0	0	0	0	0	0
Geothermal	0	0	0	0	0	0	0
Cogeneration	0	0	0	0	0	0	0
CC Combustion Turbines	0	0	0	0	0	0	0
SC Combustion Turbines	0	0	0	0	0	0	0
Fuel Cells	0	0	0	0	0	0	0
Firm Purchases (SW SCCT)	0	0	0	0	0	0	0
Market Purchases	0	0	0	0	0	0	0
Total Generation/Purchase	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Surplus Sales	0	0	0	0	0	0	0
BPA Purchase Reduction	0	0	0	0	0	0	0
Net Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**

SCL SRA FEIS
Quantified Impacts, Non-Air&Fuel

YEAR 1998		Operational Impact				Land (acres)	
	Alternative SRA Recommendations						
Resource Type	Alt. A	Alt. B	Alt. C	Alt. D	Preferred	Var. 1	Var. 2
Centralia (existing pulverized coal)	18.8	18.8	19.0	19.0	18.9	18.9	18.9
Conservation	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wind	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Geothermal	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cogeneration	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CC Combustion Turbines	0.0	0.0	0.0	0.0	0.0	0.5	0.0
SC Combustion Turbines	0.0	0.0	0.0	0.0	0.0	0.0	0.5
Fuel Cells	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Firm Purchases (SW SCCT)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Market Purchases	15.0	15.2	18.8	19.0	16.0	14.0	14.0
Total Generation/Purchase	**33.8**	**34.0**	**37.8**	**38.0**	**34.9**	**33.3**	**33.3**
Surplus Sales	25.5	25.1	20.9	20.6	24.0	24.0	24.0
BPA Purchase Reduction	5.0	5.0	13.6	13.5	6.9	6.9	6.9
Net Total	**3.3**	**3.9**	**3.3**	**3.9**	**3.9**	**2.4**	**2.4**

SCL SRA FEIS
Quantified Impacts, Non-Air&Fuel

YEAR 1998		Construction Impacts			Land (acres)		
	Alternative SRA Recommendations						
Resource Type	Alt. A	Alt. B	Alt. C	Alt. D	Preferred	Var. 1	Var. 2
Centralia (existing pulverized coal)							
Conservation							
Wind							
Geothermal							
Cogeneration							
CC Combustion Turbines							
SC Combustion Turbines							
Fuel Cells							
Firm Purchases (SW SCCT)							
Market Purchases							
Total Generation/Purchase							
Surplus Sales							
BPA Purchase Reduction							
Net Total							

YEAR 1998	**Fuel Use Rates**		
		Natural	Backup
	Coal	Gas	Fuel Oil
Resource Type	tons/aMW	1000cf/aMW	1000gal/aMW
Centralia (existing pulverized coal)	6156	0	0
Conservation	0	0	0
Wind	0	0	0
Geothermal	0	0	0
Cogeneration	0	59704	0
CC Combustion Turbines	0	60759	24
SC Combustion Turbines	0	90572	35
Fuel Cells	0	51029	0
Firm Purchases (SW SCCT)	0	90572	35
Market Purchases	1958	51968	0
Total Generation/Purchase			
Surplus Sales	1958	51968	0
BPA Purchase Reduction	1958	51968	0
Net Total			

		RESOURCE ASSUMPTIONS					
YEAR 1998		**Alternative SRA Recommendations**					
		aMW (Generation)			**Operation Impacts**		
Resource Type	Alt. A	Alt. B	Alt. C	Alt. D	Preferred	Var. 1	Var. 2
Centralia (existing pulverized coal)	75.3	75.3	75.9	75.9	75.5	75.5	75.5
Conservation	26.0	20.0	26.0	20.0	20.0	20.0	20.0
Wind							
Geothermal							
Cogeneration							
CC Combustion Turbines						20.0	
SC Combustion Turbines							20.0
Fuel Cells							
Firm Purchases (SW SCCT)							
Market Purchases	146.1	148.1	183.4	185.7	156.2	136.2	136.2
Total Generation/Purchase	**247.4**	**243.4**	**285.3**	**281.6**	**251.7**	**251.7**	**251.7**
Surplus Sales	248.3	245.1	203.9	201.0	234.6	234.6	234.6
BPA Purchase Reduction	48.9	48.5	132.4	132.0	67.5	67.5	67.5
Net Total	**-49.8**	**-50.2**	**-51.0**	**-51.4**	**-50.4**	**-50.4**	**-50.4**

YEAR 1998		Fuel Use		Coal (tons)			
		Alternative SRA Recommendations					
Resource Type	Alt. A	Alt. B	Alt. C	Alt. D	Preferred	Var. 1	Var. 2
Centralia (existing pulverized coal)	463547	463,547	467,240	467,240	464,778	464,778	464,778
Conservation	0	0	0	0	0	0	0
Wind	0	0	0	0	0	0	0
Geothermal	0	0	0	0	0	0	0
Cogeneration	0	0	0	0	0	0	0
CC Combustion Turbines	0	0	0	0	0	0	0
SC Combustion Turbines	0	0	0	0	0	0	0
Fuel Cells	0	0	0	0	0	0	0
Firm Purchases (SW SCCT)	0	0	0	0	0	0	0
Market Purchases	286064	289,980	359,097	363,601	305,840	266,680	266,680
Total Generation/Purchase	**749,611**	**753,527**	**826,338**	**830,841**	**770,618**	**731,458**	**731,458**
Surplus Sales	486,171	479,906	399,236	393,558	459,347	459,347	459,347
BPA Purchase Reduction	95,746	94,963	259,239	258,456	132,165	132,165	132,165
Net Total	**167,693**	**178,658**	**167,862**	**178,827**	**179,106**	**139,946**	**139,946**

SCL SRA FEIS
Quantified Impacts, Fuel Use

YEAR 1998		Fuel Use		Natural Gas (1000 cf)			
		Alternative SRA Recommendations					
Resource Type	Alt. A	Alt. B	Alt. C	Alt. D	Preferred	Var. 1	Var. 2
Centralia (existing pulverized coal)	0	0	0	0	0	0	0
Conservation	0	0	0	0	0	0	0
Wind	0	0	0	0	0	0	0
Geothermal	0	0	0	0	0	0	0
Cogeneration	0	0	0	0	0	0	0
CC Combustion Turbines	0	0	0	0	0	1215180	0
SC Combustion Turbines	0	0	0	0	0	0	1811440
Fuel Cells	0	0	0	0	0	0	0
Firm Purchases (SW SCCT)	0	0	0	0	0	0	0
Market Purchases	7592525	7696461	9530931	9650458	8117402	7078042	7078042
Total Generation/Purchase	**7592525**	**7696461**	**9530931**	**9650458**	**8117402**	**8293222**	**8889482**
Surplus Sales	12903654	12737357	10596275	10445568	12191693	12191693	12191693
BPA Purchase Reduction	2541235	2520448	6880563	6859776	3507840	3507840	3507840
Net Total	**-7852365**	**-7561344**	**-7945907**	**-7654886**	**-7582131**	**-7406311**	**-6810051**

YEAR 1998		**Fuel Use**		**Backup Fuel Oil (1000gals)**			
		Alternative SRA Recommendations					
Resource Type	Alt. A	Alt. B	Alt. C	Alt. D	Preferred	Var. 1	Var. 2
Centralia (existing pulverized coal)	0	0	0	0	0	0	0
Conservation	0	0	0	0	0	0	0
Wind	0	0	0	0	0	0	0
Geothermal	0	0	0	0	0	0	0
Cogeneration	0	0	0	0	0	0	0
CC Combustion Turbines	0	0	0	0	0	480	0
SC Combustion Turbines	0	0	0	0	0	0	700
Fuel Cells	0	0	0	0	0	0	0
Firm Purchases (SW SCCT)	0	0	0	0	0	0	0
Market Purchases	0	0	0	0	0	0	0
Total Generation/Purchase	**0**	**0**	**0**	**0**	**0**	**480**	**700**
Surplus Sales	0	0	0	0	0	0	0
BPA Purchase Reduction	0	0	0	0	0	0	0
Net Total	**0**	**0**	**0**	**0**	**0**	**480**	**700**

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